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# LONGMANS'
# ATRICULATION GEOGRAPHY

BY

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PROFESSOR OF ECONOMIC GEOGRAPHY
IN THE UNIVERSITY OF LONDON

*With Maps, Diagrams and Illustrations*

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## PUBLISHERS' NOTE

In view of the recent extensive political changes that have occurred in India and surrounding countries a thorough revision of this book is in preparation.

The current demand, however, has exceeded expectations and this urgent reprint has been called for. To avoid keeping the public waiting for the full scale revision which will appear in due course, the publishers have decided that the present reprint shall be issued with the very minimum of corrections. These have been confined principally to Chapter XXI which deals with States, Provinces and Towns. Throughout the rest of the book the word 'India' should be taken to mean the geographic entity of undivided India, although politically the territory has, of course, been partitioned to form the Dominion of Pakistan and the new Republic of India.

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# PREFACE TO THE SECOND EDITION

THE fact that Geography has been lately recognised as an important subject in the School Curriculum is in keeping with the signs of the times. Geography is no longer a study of the list of names of mountains, rivers, towns, gulfs etc., but is the study of the Life of Man on Earth, and has, as such, come to be regarded as a science. The study of the Natural Regions of the World is coming to the forefront, of late, owing to the possibility of the application of the knowledge gained in one type of Natural Region to the pursuit of an identical occupation desired to be followed in another locality, having similar climatic conditions. For example, the Russian farmer can take advantage of the lesson learnt in the cold wheat-farming districts of Canada; and the experiences gained on the irrigated banks of the Nile can be profitably applied to the irrigated lands of Sind. The establishment of the casual relation is, thus, of vital importance in Geography. Again, the study of Geography is doubly interesting because it brings us in contact with peoples having different civilization, and tells us about the felicitous adaptation of man to his natural environment.

This has always been kept in view in the arrangement of matter for this book, though the chapters have been designed to cover, item by item, the Syllabus in Geography prescribed by the Bombay University for the Matriculation Examination.

In the first part, it has been endeavoured to explain the knotty points in Physical Geography by reference to the Natural Phenomena observed in daily life, and the Inductive method for the treatment of the subject has been adopted. The interaction between Natural Regions, vegetation, animal life and human occupations has been succinctly brought out.

Since a detailed study of India forms a major portion of the Syllabus, it has been thought fit to include information on the ports of India which play no mean part in the trade of the country. A few lines have also been devoted to the consideration of the hydro-electric development in India, looking to the important role India will have to play in the task of effecting industrial co-operation with the countries of the British Empire and of attaining a self-sufficiency which will prove invaluable in the near future.

The third part of the book has been devoted to the consideration of the Geography of Human Settlement in the different Continents, in relation to the Natural Regions of the World. The history of the settlement, by civilised peoples, in lands in America, Australia, New Zealand, Africa and the Far East is particularly instructive.

Geography is the background of history and this second edition is issued in the midst of the greatest war in history, when, indeed, the future of many countries is unknown. It should be the task of the teacher to make constant reference to current events and to seek the help of geography in their proper understanding. The present War has many lessons to offer, even a Totalitarian state has to depend upon its neighbouring nations for some supplies and no country can be self contained. And it is to be hoped that the time-old lesson that Nations must behave towards each other as neighbours will establish itself once more at the conclusion of the War.

It is hoped that both pupils and teachers will find the diagrams, statistics and questions, freely made use of in the text, of immense interest. In this connection, the Taj Mahal Atlas or Collins-Longmans' Study Atlas which have been prepared to suit the needs of Indian pupils, can be used with advantage.

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# PART 1. GENERAL GEOGRAPHY

## CHAPTER I

## THE EARTH: ITS PLACE IN THE HEAVENS

**The Earth as a heavenly body.**—In a level district or upon the open sea an observer seems, on cloudless days, to stand at the centre of a vast circular surface or plane, and this plane appears to be the base of a huge vault which we call the sky or heavens. The sky is not a real object, but only an appearance that is due to the blue light that is reflected from the air to our eyes.

The earth or terrestrial sphere appears to be at the centre of the great sphere of the heavens called the celestial sphere, the observer on any open plain having on clear days a visible half of the celestial sphere above his horizon, and an invisible half below his horizon.

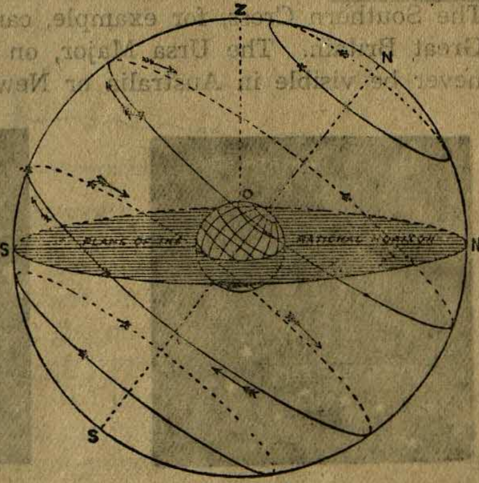
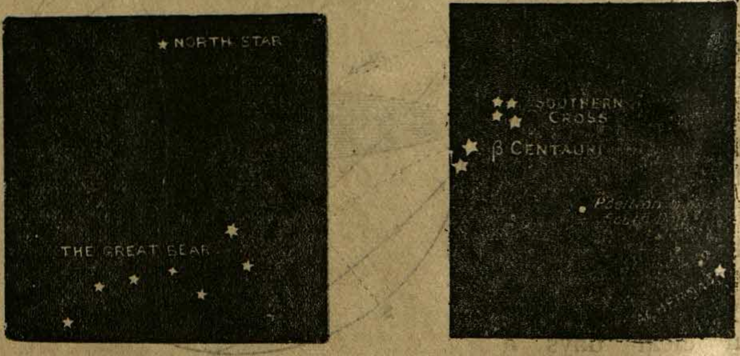


FIG. 1.—The Celestial Sphere surrounding the Earth, as it appears to an observer at O. He has a *sensible horizon* that forms a tangent plane at O. Z is the observer's zenith. NS is the celestial axis about which the heavenly bodies appear to rotate. The *Rational horizon* plane passes through the middle of the earth and parallel to the sensible horizon.

**Apparent Diurnal Motion of the Stars.**—If we watch the stars on a clear night we soon notice that they change their positions with respect to the horizon, owing to the earth's rotation on its axis. A star which rises at the east point of the horizon ascends in an arc to its highest point on the meridian, and then declines and sets at the west point. These stars in fact move daily in circular paths round the Pole Star which hardly appears to move at all. The *altitude* (its angular height above the horizon) *is always equal to the latitude of the place of observation.*

In high latitudes certain circumpolar stars are seen to perform their daily apparent motion above the horizon without setting. Below the horizon are certain stars that never rise, and which, therefore, the observer never sees. The Southern Cross, for example, can never be visible in Great Britain. The Ursa Major, on the other hand, can never be visible in Australia or New Zealand.



2a 2b

FIGS. 2a and 2b.—The chief Constellations in (a) the Northern and (b) the Southern Hemisphere.

To an observer at the equator all stars appear to rise and set in circles perpendicular to the horizon. In one complete day the whole sky with its stars becomes visible. The North Star and the Southern Cross are seen on opposite sides of the horizon.

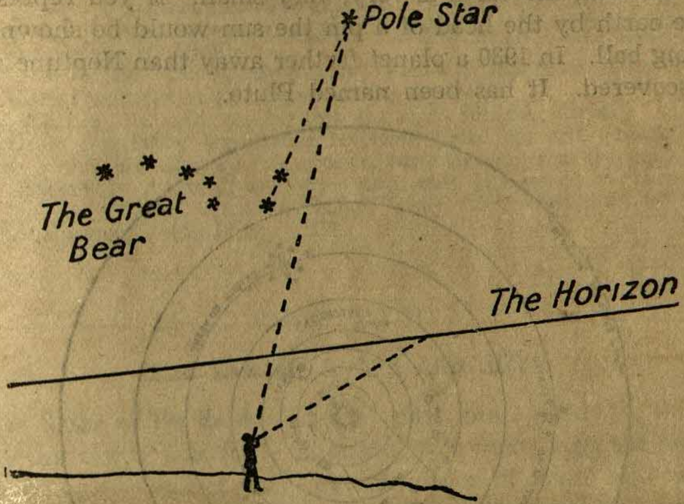


FIG. 3.—Determining latitude.

## THE SOLAR SYSTEM AND THE STARS

**The Solar System.**—In the old days men used to think that the earth was fixed and that all the stars moved round it. We now know that the sun is fixed and that moving round it are a number of large spheres called *planets*, of which our earth is one. All the planets are moving round the sun, but they do not all move round at the same rate. The earth takes one year to move round the sun, causing the seasons. The earth is 93,000,000 (93 million) miles from the sun; some of the other planets such as Mercury and Venus are nearer the sun, the others (Mars, Jupiter, Saturn, Uranus, and Neptune) are farther away. Moving round the earth is a much smaller body—the moon. Another planet, Neptune, has a moon of its own, whilst others have more than one moon. Jupiter has four moons and Saturn eight. Compared with the sun, the moon is quite near the earth—only 240,000 miles away. Compared with the great size of the sun, the earth is very, very small. If you represent the earth by the head of a pin the sun would be shown by a big ball. In 1930 a planet farther away than Neptune was discovered. It has been named Pluto.

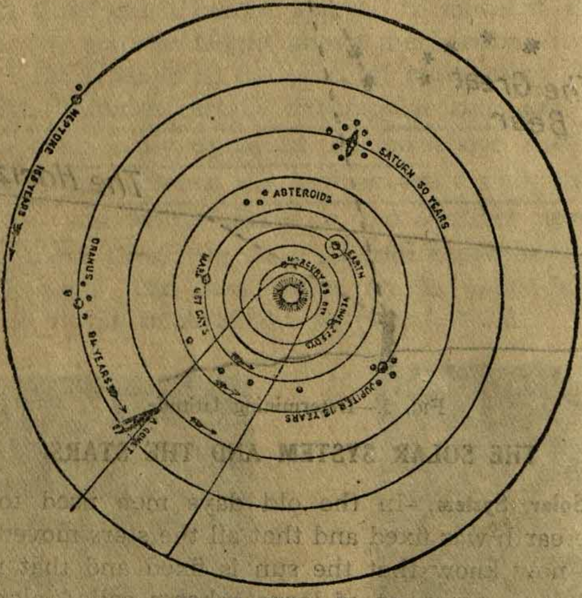


FIG. 4.—Solar System.

**The Stars.**—Quite different from the planets are the stars which are very much farther away, and do not move round the sun. They appear to us to be fixed. The stars are very useful to us in geography, especially the star near the North Pole (that is, directly overhead at the earth's north pole) and which we call the Pole Star. Stars shine by their own light. Planets reflect the light of the sun. Stars twinkle, while most planets have a steady light.

### QUESTIONS AND EXERCISES

1. How do you find the Pole Star? What is the angular distance of the Pole Star at your place? Find the Latitude of your place from the Atlas. What do you notice?
2. Name the constellation which guides sailors over oceans in the Southern Hemisphere. Draw a diagram of this constellation. In what latitude is this constellation not visible?
3. How do the stars appear to rotate each day (*a*) to an observer at the North Pole; (*b*) to an observer at the Equator?
4. What is the difference between the stars and the planets? Draw a diagram illustrating the planets revolving round the sun. Name the planets in the solar system in the order of their distance from the sun.
5. Explain by means of a diagram that what in common parlance we call 'up' and 'down', means, in reality, 'away from' and 'towards' 'the centre of gravity' respectively.

## CHAPTER II

## THE EARTH: SHAPE AND SIZE

**The Shape of the Earth.**—In the past men used to think that the earth was flat. Thousands of years ago the wise Greeks knew that it was not; hundreds of years ago men first sailed right round the earth in ships, and so proved that it was not.

In the present century it is very common for people to travel round the earth. In the cool season, Rangoon, Calcutta, Colombo, and Bombay are visited by great steamers carrying people on a tour round the world.

Every summer a number of New Zealanders visit London, some arriving from the east via the Indian Ocean and the Suez, and some from the exactly opposite direction, viz. via the Pacific Ocean and the Pana Canal.

All these steamers go round the earth in an east and west direction, but it is also possible to go round in a north and south direction. That is much more difficult, because we have to pass through the very cold Arctic and Antarctic regions, and only a few brave men have been able to penetrate into the heart of those cold lands.

This proves beyond doubt that the earth's surface is curved.

There are other ways of proving that the earth is round. Here are some:

(*a*) We can actually see and measure the curvature of the earth. A great expanse of water—such as a calm sea—we think is flat, but in reality it curves gradually with the earth. Choose an area where the sea is smooth and shallow, take three poles and drive them into the sea bottom so that in each case exactly the same length of pole appears above the surface of the water. One expects that the three poles must be in a straight line, but if observed from the top of the first to the third through a telescope, the middle one will appear higher. Fig. 5 will help you to see why.

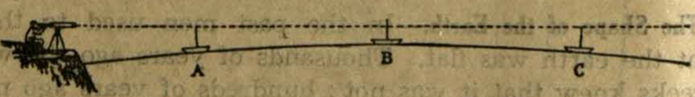


FIG. 5.—Diagram to illustrate the Bedford Level experiment carried out by engineers, in A.D. 1640, in an attempt to drain the marshes in the East of England.

(*b*) If we watch with a telescope a distant ship coming into view we see first of all the masts, then the funnel, and finally the hull. Similarly, if the ship is moving away it is the hull which disappears from view first. If the surface of the water were perfectly flat the steamer would look smaller in the distance, one part would not go out of sight before another.

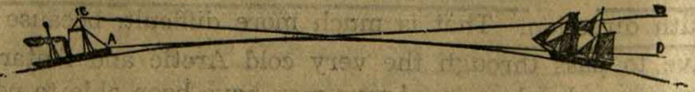


FIG. 6.—Diagram showing curvature of the surface of the sea.

(*c*) A man standing on the seashore can only see a short distance ; if he wants to see farther he must ascend a hill. From an aeroplane he would be able to see still further.

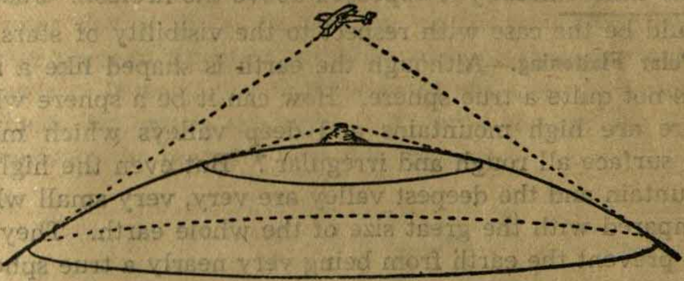


FIG. 7.—Circular Horizon increasing with Altitude above the Surface.

(*d*) The bright appearance of the moon is caused by the sun's light shining on her and being reflected to us on the earth. There are times when the earth gets between the sun and the moon, so that the earth casts a shadow on the moon. This is called an eclipse, and we notice that the shadow is always circular. So we know that the earth must be spherical.

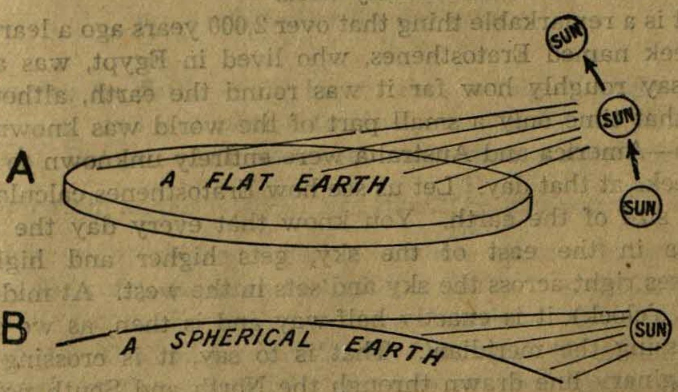


FIG. 8.—Sunrise if the earth were flat (A) ; sunrise as it actually is (B).

(*e*) The sun rises earlier for places to the east than it does for places to the west. If the earth were flat the sun would be visible at all places on the earth's surface at the same time—directly it appeared above the hroizon. Just so would be the case with respect to the visibility of stars.

**Polar Flattening.**—Although the earth is shaped like a ball it is not quite a true sphere. How can it be a sphere when there are high mountains and deep valleys which make the surface all rough and irregular ? But even the highest mountain and the deepest valley are very, very small when compared with the great size of the whole earth. They do not prevent the earth from being very nearly a true sphere. But there is another reason why it is not a perfect ball. The earth is just a little flattened at the poles, and 'bulges out' a little at the equator. You know that an orange is just a little flattened at each end, and the earth is just a little like that.

**Size of the Earth.**—It would be possible, though very difficult and expensive, to measure the distance round the earth by actually going round it with some sort of measuring apparatus. There are, however, other ways of measuring the earth which are usually used.

It is a remarkable thing that over 2,000 years ago a learned Greek named Eratosthenes, who lived in Egypt, was able to say roughly how far it was round the earth, although at that time only a small part of the world was known to him—America and Australia were entirely unknown to the Greeks at that day. Let us see how Eratosthenes calculated the size of the earth. You know that every day the sun rises in the east of the sky, gets higher and higher, passes right across the sky and sets in the west. At midday (12 o'clock) it is exactly half-way and is then, as we say, 'crossing the meridian'. That is to say, it is crossing an imaginary line drawn through the North and South points of the sky and passing through the point (the zenith) immediately above our heads. Eratosthenes, living in Egypt, was able to observe the sun from a place called Assuan, and on one day found that at midday it was directly over his head, or in other words, coincided with his zenith. On the same day at the same time the sun was observed from another place in Egypt called Alexandria—a long way north of Assuan. It was found that the sun there was not directly overhead, but made an angle of 7° with the zenith. Let us see from the diagram how this happens.

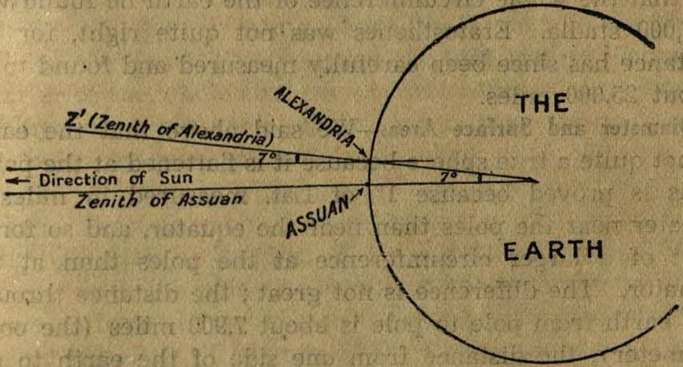


FIG. 9.—Eratosthenes' measurements.

**Measuring the Earth.**—You know that a right angle is like this ∟ and is divided into ninety little divisions called degrees. But you can have bigger angles than a right angle. Put four right angles together like this ┘└┐┌ and you will see that four right angles make up a whole circle. In other words, and complete circle is 4×90° or 360°. It is thus 360° round the earth. Eratosthenes found that the distance from Assuan to Alexandria was 7° of Lat., and he actually measured on the ground the distance between these two towns. He did not measure it in miles as we do nowadays.

but he used the Greek measure called a stadium. Then he worked out a proportion sum like this:

If 7° of Lat. between Assuan and Alexandria are represented by 5,000 stadia, 1° must be represented by $\frac{5000}{7}$ stadia;

$$\therefore 360° \text{ must be represented by } \frac{360 \times 5000}{7} = \frac{1{,}800{,}000}{7} \text{ stadia.}$$

So that the whole circumference of the earth he found was 257,000 stadia. Eratosthenes was not quite right, for the distance has since been carefully measured and found to be about 25,000 miles.

**Diameter and Surface Area.**—We said above that the earth is not quite a true sphere because it is flattened at the poles. This is proved because 1° of Lat. measured in miles is greater near the poles than near the equator, and so forms part of a larger circumference at the poles than at the equator. The difference is not great; the distance through the earth from pole to pole is about 7,900 miles (the polar diameter), the distance from one side of the earth to the other is about 7,926 miles (equatorial diameter). Figures are not really very important in geography, but it may be useful to know that the total surface of the earth is 197,000,000 square miles. More than two-thirds of this is water.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches etc.

1. Give some proofs to prove that the earth is round. Which do you think are the two best proofs? Give reasons.
2. On July 29th, the sun is exactly overhead at Bombay (i.e. makes a right angle). On the same day at Ahmedabad, 345 miles north of Bombay it shines at an angle of 85°. Now find out the size of the circumference of the earth.
3. Describe the Bedford Level experiment. Show by means of a diagram, how it proves that the surface of the earth is round.
4. One day, Eratosthenes observed a complete form of the sun reflected in the waters of a vertical well in Assuan. Calculate the altitude of the sun and the exact time of observation.

## CHAPTER III

## LATITUDE AND ZONES

**Latitude**—When we are at sea there are no landmarks, and we do not know if we are near land or a long way from it. For this reason it has been found expedient to devise a series or network of lines over the surface of the earth with reference to the North and South Poles, and these form two important points. Running round the earth halfway between the two poles we imagine a line which we call the *Equator*. *If* you go from the Equator to the North Pole or the South Pole you will see that you go through a quarter of the whole circle or circumference ; that is, you go through one right angle or 90°, and so from the equator to the poles we mark off ninety divisions, each forming one degree. We can draw lines round the earth parallel to the equator through each of these divisions. These lines are called *parallels of latitude*. Each parallel of latitude forms a circle with the pole as centre, but the circles get smaller as we go from the equator to the poles. We start numbering the parallels of latitude at the equator, which is called 0°, till we reach the poles, which are 90°. Those north of the equator form north latitude, those south south latitude. Each degree of latitude can further be divided into sixty divisions called minutes. Each minute can be divided into sixty seconds. The latitude of a place can be defined as its distance north or south of the equator, measured as an angle.

**Some Important Parallels of Latitude.**—There are two important angles. They are 23½° and 66½°. You have already learnt that the earth's axis is inclined, as we say, to the plane of its orbit. The angle of inclination is 66½°. If you subtract 66½° from 90° you get 23½°. The Tropic of Cancer, about which you have already learnt, is the same as latitude 23½° North, and the Tropic of Capricorn the same as latitude 23½° South. The latitude 66½° North we call the Arctic Circle, latitude 66½° South is the Antarctic Circle.

You learnt above that at some seasons of the year a man standing at the poles would not see the sun at all during the day, at other seasons of the year the sun is shining all day and all night too. Within the Arctic and Antarctic Circles there is at least one day in the year during which the sun does not set and at least one day on which it never rises. As we get nearer and nearer the poles the number of such days increases until at the poles themselves there is darkness for half the year and sunlight for the other half.

**The Zones.**—We shall learn later that the heat of the sun is stronger near the equator than at the poles, and so the hot parts of the globe are nearer the equator and the coldest parts round the poles. We can divide the earth into five *zones*: inside the Arctic and Antarctic Circles we have the Cold or Frigid Zones (north and south); on either side of the equator, but between the two tropics, we have the Hot or Torrid Zone; between the Tropic of Cancer and the Arctic Circle is the North Temperate Zone; between the Tropic of Capricorn and the Antarctic Circle is the South Temperate Zone. Note that outside the tropics the sun is never shining vertically overhead.

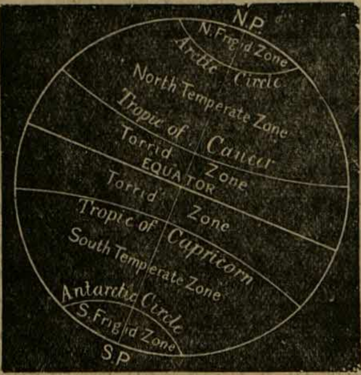


FIG. 10.—Diagram showing the heat zones of the World.

**How Sailors find Latitude at Sea.**—Sailors at sea find the latitude of their ship by observing the sun at midday; we can also find it by observing the Pole Star or some particular star. Let us see how to do it by using the Pole Star. Remember that latitude is the angular distance of a place from the equator, and remember that the zenith of a place is the point of the sky immediately above a place. So the latitude is also the angular distance between its zenith and the zenith of a place on the equator. Similarly, the Pole Star is the zenith of the North Pole. At the equator the observer would see the Pole Star on the horizon; going northwards 1° or 69 miles, it would be 1° above the horizon and so for every degree of latitude passed over, the star rises 1° in altitude, until at the pole it would be found to be overhead.

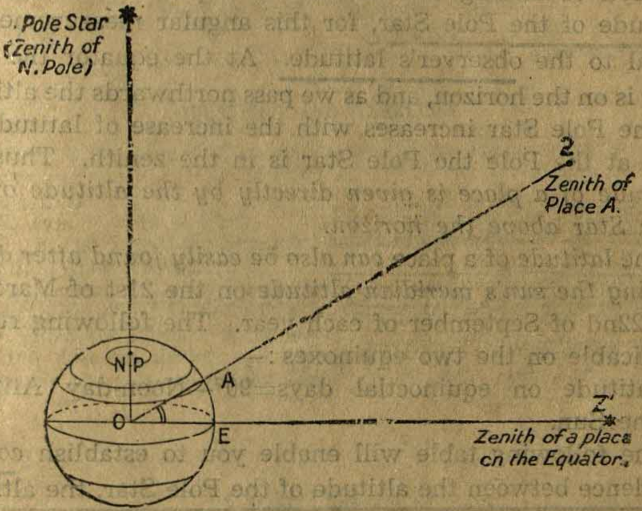


FIG. 11.—The meaning of latitude.

If we use the sun at midday or other stars we measure the angle of the sun or star above the horizon with our sextant, and then we refer to a big book called the *Nautical Almanac,* in which there are tables showing how to find the latitude from this observation. This is the way in which all ships find their latitude, and so make sure that they are keeping to their proper courses and not being blown by wind or carried by currents into places where there is danger.

**Determination of Latitude.**—It is a great advantage that places on the surface of the earth can be determined with reference to the Pole Star as well as the Sun. The simplest method of finding the latitude of a place is to find the altitude of the Pole Star, for this angular measurement is equal to the observer's latitude. At the equator the Pole Star is on the horizon, and as we pass northwards the altitude of the Pole Star increases with the increase of latitude, so that at the Pole the Pole Star is in the zenith. Thus *the latitude of a place is given directly by the altitude of the Pole Star above the horizon.*

The *latitude* of a place *can also be easily found after determining the sun's meridian altitude* on the 21st of March or the 22nd of September of each year. The following rule is applicable on the two equinoxes :—

Latitude on equinoctial days=90°—Noon-day Altitude of the Sun.

The following table will enable you to establish correspondence between the altitude of the Pole Star, the altitude of the noon-day sun at the equinoxes and the latitude of a place :—

| Place | | Altitude of the Pole Star | Altitude of the Midday Sun at the Equinoxes | Latitude of the Place |
|---|---|---|---|---|
| Singapore | .. | Northern Horizon | Overhead | 0° (Equator) |
| Colombo | .. | 8°<br>(Northern Sky) | 82°<br>(Southern Sky) | 8° N.L. |
| Poona | .. | 18°30′<br>(Northern Sky) | 71°30′<br>(Southern Sky) | 18°30′ N.L. |
| Mandalay | .. | 23°30′<br>(Northern Sky) | 66°30′<br>(Southern Sky) | 23°30′ N.L.<br>(Tropic of Cancer) |

| Place | Altitude of the Pole Star | Altitude of the Midday Sun at the Equinoxes | Latitude of the Place |
|---|---|---|---|
| Peshawar .. | 34° (Northern Sky) | 56° (Southern Sky) | 34° N.L. |
| Bukhara .. | 40° (Northern Sky) | 50° (Southern Sky) | 40° N.L. |
| London .. | 52°30′ (Northern Sky) | 37°30′ (Southern Sky) | 52°30′ N.L. |
| Ft. Yukon .. | 66°30′ (Northern Sky) | 23°30′ (Southern Sky) | 66°30′ N.L. (Arctic Circle) |
| Spitsbergen .. | 78° (Northern Sky) | 12° (Southern Sky) | 78° N.L. |
| North Pole .. | 90° (Northern Sky) | 0° (Southern Sky) | 90° (North Pole) |

## QUESTIONS AND EXERCISES

1. What is the altitude of the midday sun at the equinoxes and solstices to an observer (*a*) at Lat. 20°N.; (*b*) at Lat. 50°N.; (*c*) at Lat. 66½°S.; (*d*) at Lat. 0°?

2. Explain how the latitude of a place can be found at noon time on 21st March, 21st June, 22nd September and 23rd December. Draw diagrams to illustrate your answer.

3. At a certain place on December 21, the sun's maximum altitude was observed to be 14°. The declination of the sun on the day in question was 23½°S. Find the latitude of the place.

4. How does the shadow cast by a vertical pole, in an open ground at noon, enable you to calculate the altitude of the sun at the time?

# CHAPTER IV

# LONGITUDE AND TIME

**Longitude.**—We have now a means of showing distance from the equator or the poles, but we must have some means of measuring round the earth. Then we can draw lines from the North Pole to the South Pole passing through each of these divisions. These are lines or meridians of longitude. How shall we number the meridians of longitude? At the town of Greenwich near London there is a famous observatory where the stars and objects of the sky have long been studied, so it is usual to start with the line of longitude which passes through Greenwich and call it 0°. Then we number the degrees east and west of Greenwich till we reach halfway round the globe, and the line 180° west of Greenwich is the same as that 180° east of Greenwich. We can divide degrees of longitude into minutes. The longitude of a place can be defined as its distance east or west of the meridian of Greenwich, measured as an angle.

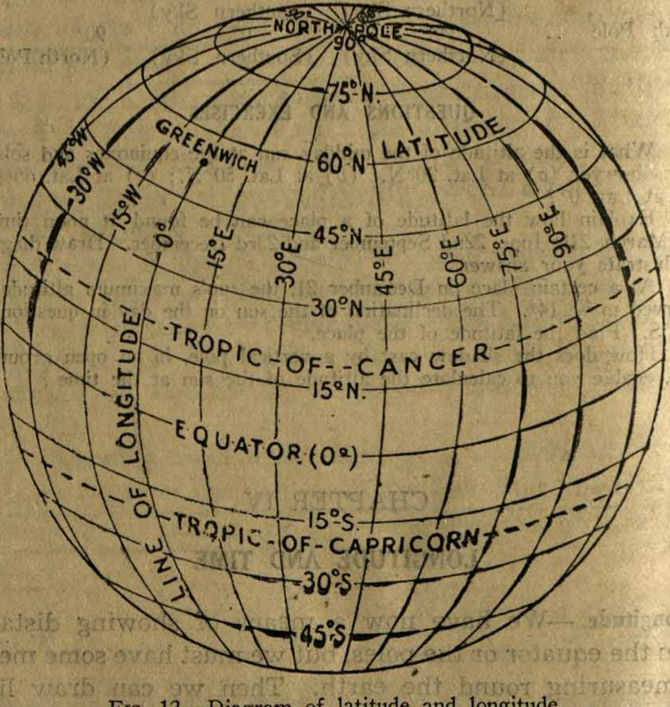


FIG. 12.—Diagram of latitude and longitude.

**Local Time.**—When the sun is crossing the meridian of any place it is twelve o'clock or midday at that place, according to 'local time'. In other words, on any day when the sun reaches its highest point in the sky it is noon of local time.

To find accurately when the sun is crossing the meridian we have to use an instrument called a sextant. Now Fig. 13 shows two places, A and B, quite close together on the earth's crust. As the earth revolves on its axis in the direction shown by the arrow it is obvious that A will come directly under the sun before B, so that it will be noon at A before it is at B. It is only if two places are directly north or south of one another—that is, if they are on the same meridian of longitude—that they will come under the sun at the same time, and so, have the same local time. Thus Rangoon and Mandalay have nearly the same local time because they are nearly on the same line of longitude, but the local times of Rangoon, Calcutta, and Bombay are different.

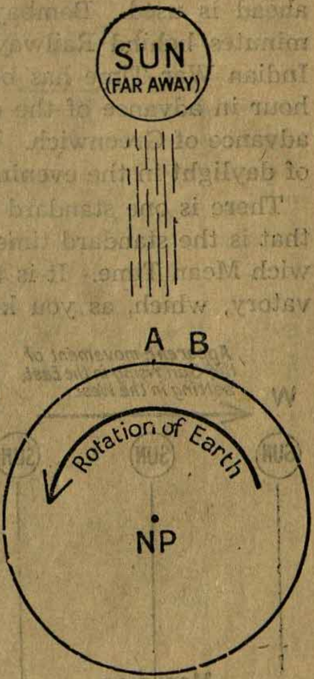


Fig. 13.—Diagram to illustrate the meaning of local time.

**Standard Time.**—It would be very difficult if every town and village in a country had its own time, and whenever we moved from one village to another we should have to alter all our watches and clocks. So it is usual to choose for each country or each part of a large country a standard time for use over the whole country. It is as a rule the local time of the most important town in the country, or the local time of some place near the centre of the country. Some countries have more than one standard time. ~~Thus in India all the~~

~~railways use 'Railway Standard Time', but in Calcutta for all ordinary purposes Calcutta Standard time 24 minutes ahead is used. Bombay also uses local time, thirty-nine minutes behind Railway time. Since 1st September 1942 Indian War Time has been used all over India. It is one hour in advance of the old Railway time and 6½ hours in advance of Greenwich. Using this time gives an extra hour of daylight in the evening and it saves artificial lighting.~~

~~There is one standard time which is very important, and that is the standard time of England, usually called Greenwich Mean Time. It is the local time of Greenwich Observatory, which, as you know, is on longitude 0°.~~

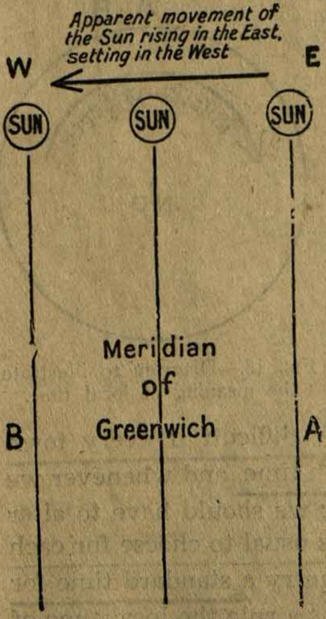

Apparent movement of the Sun rising in the East, setting in the West
W
E
SUN
SUN
SUN
Meridian of Greenwich
B
A

FIG. 14.

*How Longitude is determined.*—The earth takes twenty-four hours to revolve once on its axis, and in that time passes through 360°. Thus in one hour the earth moves 15°, or in four minutes through 1°. Now look again at Fig. 13. Suppose the places A and B are 1° apart. A will be directly under the sun (*i.e.* it will be midday local time) four minutes before B. There is thus four minutes' difference in local times for each degree of longitude. We use this fact for determining longitude. All longitudes are measured from the meridian of Greenwich, and so we use Greenwich Time as a standard of comparison. We have very accurate clocks called chronometers, showing Greenwich time, and we compare them with local time. For each degree east or west of Greenwich there will be four minutes' difference, so if the difference is eight hours, the longitude will be $\frac{8\times60}{4} = \frac{480}{4} = 120°$.

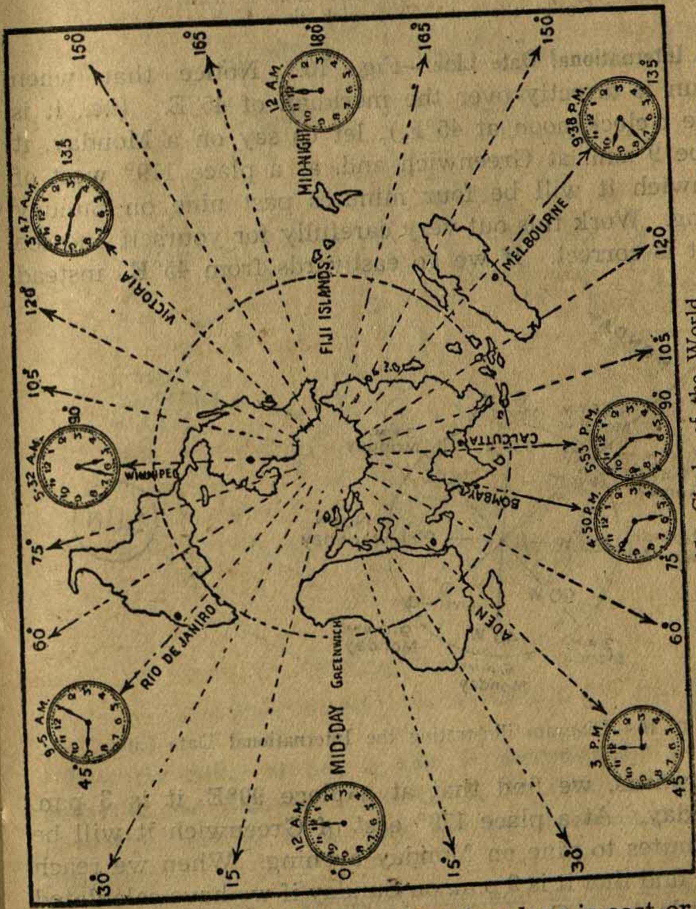


FIG. 15.—Clocks of the World.
Notice how they show the time at different places. Give the Local Times for the longitudes where, in the above diagram, clock dials are not given. Also find the accurate longitudes for all the towns of which the local time has been given.

We now have to decide whether the place is east or west of Greenwich. Look at Fig. 14. If A is east of Greenwich it will be directly under the sun long before Greenwich is, and it will be noon at A when it is still early at Greenwich. So if local time is *in advance* of Greenwich time, the place is *east*. Here is a rhyme which will help you to remember:

> Go to the east Greenwich time is least,
> Go to the west Greenwich time is best.

**The International Date Line.**—Fig. 16. Notice that when the sun is directly over the meridian of 45°E. (*i.e.*, it is twelve o'clock noon at 45°E.), let us say on a Monday, it will be 9 a.m. at Greenwich and, at a place 179° west of Greenwich it will be four minutes past nine on Sunday evening. Work this out very carefully for yourself and see that it is correct. If we go eastwards from 45°E., instead of westwards, we find that at a place 90°E. it is 3 p.m. on Monday. At a place 179° east of Greenwich it will be four minutes to nine on Monday evening. When we reach 180° we find that it is 9 p.m. on Sunday if we have calculated westwards from Greenwich, but 9 p.m. on Monday if we have calculated eastwards from Greenwich. So we have to draw a line somewhere near the meridian of 180°, and agree

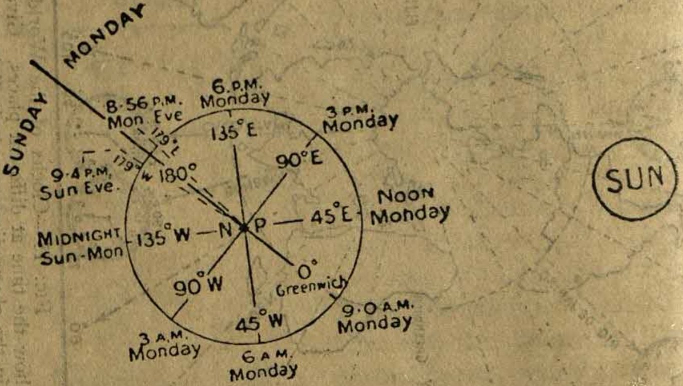


FIG. 16.—Diagram illustrating the International Date Line.

to say that on one side it is Sunday, and on the other side Monday. Look at Fig. 17 to see what happens when a ship crosses this 'International Date Line'.

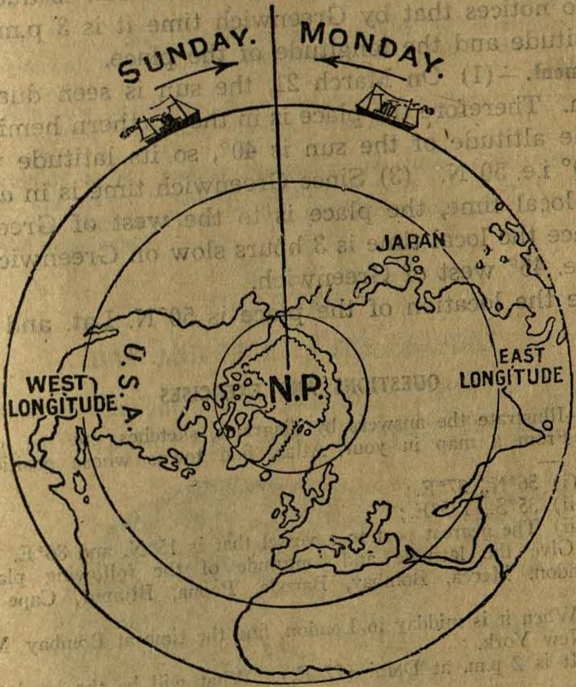


Fig. 17.—What happens when the Date Line is crossed.

**How the Sailor at Sea is able to Determine his Position by means of the Sun.**—We saw on p. 14 that *on equinoctial days* the latitude of a place can be determined from the formula :—

Lat.=90°—Noon-day Altitude of the Sun.

We have seen that if the local noon of a place is one hour in advance of Greenwich time, the place is 15° to the east of Greenwich ; and if the local noon is one hour slower

910 1540

than the noon at Greenwich, the place is 15° to the West of Greenwich. And so we can determine the longitude.

**Example.**—On March 21st a sailor notices that the altitude of the noon-day sun is 40° and that the sun is due south. He also notices that by Greenwich time it is 3 p.m. Find the latitude and the longitude of the place.

**Argument.**—(1) On March 21, the sun is seen due South at noon. Therefore the place is in the northern hemisphere. (2) The altitude of the sun is 40°, so its latitude will be 90°—40° i.e. 50°N. (3) Since Greenwich time is in *advance* of the local time, the place is to the west of Greenwich. (4) Since the local time is 3 hours slow on Greenwich, it is 3×15 i.e. 45° west of Greenwich.

Hence the location of the place is 50°N. Lat. and 45°W. Long.

### QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches, etc.

1. (*a*) From a map in your Atlas, find towns whose positions are as follows :—
   (i) 56°N., 37°E.;
   (ii) 35°S., 135°E.;
   (iii) The nearest port to a vessel that is 15°N. and 86°E.

(*b*) Give the latitude and longitude of the following places :—Cairo, London, Mecca, Bombay, Baroda, Poona, Bijapur, Cape Town, Melbourne.

2. (*a*) When it is midday in London, find the time at Bombay, Madras, Calcutta, New York.

(*b*) It is 2 p.m. at Delhi (77°E.). What will be the local time at Baghdad ?

(*c*) When it is 9 a.m. at a town of longitude 29°E., what will be the local time at San Francisco (112°W) ?

(*d*) If the local time of a place is 24 minutes in advance of the Indian Standard Time, calculate its longitude.

(*e*) When it is 6 p.m. at Greenwich what is the time at the following places ?
   (i) A town of longitude 80°W.
   (ii) The City of Poona (73° 55′E). (B.U. 1927)

(*f*) Explain.—
   (i) Why press telegrams are generally received in Bombay at about 3 a.m.
   (ii) If a ship is going east or west her clock is put forward or put back each day ; but if she is going due north or south, the clock is not changed.

3. Sir Francis Drake arrived in England having circumnavigated the earth. He thought it was Saturday, whereas it was Sunday. Give reasons for this.

4. What is the International Date Line ?
On a journey from Bombay to New York, via the Panama Canal, you observe the same day twice when crossing the date line. Why ? (B.U. 1932)

5. Describe how the latitude of a place can be determined. How will you proceed to determine the latitude of a place on a particular day ? (B.U. 1933)

6. Explain the following terms :—the earth's axis, poles, equator, zenith, Greenwich Meridian, Indian Standard Time, orbit, equinox, solstice, tropic.

7. A captain at sea makes observations on June 21 when it is noon with him. He sees the sun due south and finds the altitude to be 68°, while his chronometer shows 3.10 p.m. Greenwich time. What is the latitude and longitude ?

## CHAPTER V

## DAY AND NIGHT ; THE SEASONS

**Duration of Sunlight.**—Most people in India are under the impression that they have a twelve hours' day and a twelve hours' night. If they observe the times of sunrise and sunset they will soon discover their mistake. Times of sunrise and sunset are given in Almanacs. The duration of the

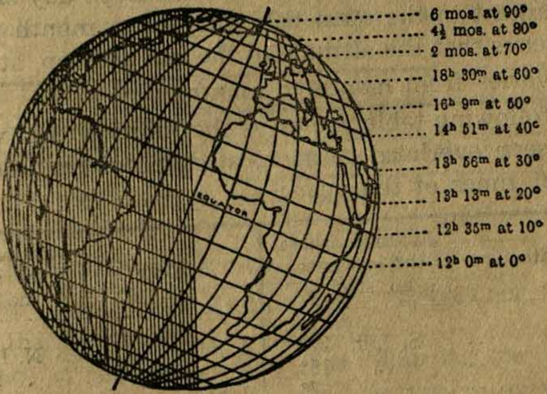


FIG. 18.—Longest Duration of Sunlight—(Northern Hemisphere).

longest day in the year varies according to the latitude of a place, as will be seen from the following table:—

| Latitude | Duration of Longest Day H. M. | Latitude | Duration of Longest Day H. M. |
|---|---|---|---|
| 0° | 12 0 | 60° | 18 30 |
| 10° | 12 35 | 60°33′ | 24 0 |
| 20° | 13 13 | | *Months.* |
| 30° | 13 56 | 70° | 2 |
| 40° | 14 51 | 80° | 4 |
| 50° | 16 9 | 90° | 6 |

At high latitudes, near mid-summer, the phenomenon of *the Midnight Sun* is observed, during which the sun, though skirting the horizon, does not dip below it. At North Cape (Lat. 73½°N.) the sun is visible at midnight from 12th May to 29th July at a stretch.

**The Altitude of the Sun at Noon.**—There are not a few people who make the mistake of supposing that the sun is always overhead at noon. If it were a fact, objects at noon would never cast any shadows except at their bases. Careful observations show us that the noon-day shadows of a monument in the open field vary from month to month. This means that the altitude of the sun at noon, at a certain place, varies from month to month.

The following table shows us the limits within which the sun is seen overhead at noon, at different latitudes and at different times of the year:—

| Date | Latitude where the sun casts no shadow | Date | Latitude where the sun casts no shadow |
|---|---|---|---|
| 1 Jan. .. | S. Lat. 23° | 1 July .. | N. Lat. 23° |
| 1 Feb. .. | " 15° | 1 Aug. .. | " 17° |
| 1 Mar. .. | " 7° | 1 Sept. .. | " 7° |
| 1 Apr. .. | N. Lat. 3° | 1 Oct. .. | S. Lat. 3° |
| 1 May .. | " 13° | 1 Nov. .. | " 13° |
| 1 June .. | " 22° | 1 Dec. .. | " 21° |

From this table draw a graph showing the latitudes where, during different times of the year, the sun casts no shadow at noon. Say on what days of the year the noon-day sun is overhead at *your* place, when he is south of the meridian and when north.

The following phenomena are worth noting with respect to the seasons of the year :—

(1) The *Vernal* or *Spring Equinox* on March 21 and the *Autumnal Equinox* on September 22, when the sun is vertically overhead at noon on the equator, making day and night everywhere of the same length.

(2) The *Solstices* when the sun appears to stop in his northward or southward course before turning in the opposite direction. On June 21, the sun is vertical at noon at all places on the Tropic of Cancer ; on December 22, at all places on the Tropic of Capricorn.

Within the two tropics every place has the sun overhead twice a year, once when moving north, once when moving south. This occurs at intervals of 6 months at the equator, but at smaller and smaller intervals north and south of the equator, until it occurs at two successive days on the tropics themselves.

Between the Tropic of Cancer and the Arctic Circle, and between the Tropic of Capricorn and the Antarctic Circle, we have two zones which have never a vertical sun, nor a day in which the sun fails to rise or set.

All places within the Arctic Circle and Antarctic Circle have at least one day in which the sun never sets, and one in which it never rises. The poles themselves see the sun for 6 months, and lose it for 6 months.

**Distribution of the Sun's Light and Heat on the Earth.**—That half of the earth's surface which is turned towards the sun receives light and heat from it ; the other half is in darkness. The heating power of perpendicular rays is more than that of slant rays. There are two reasons for this :—

(i) Perpendicular rays pass through less of the earth's atmosphere, and so less heat is absorbed by the atmosphere before they reach the ground. (ii) When the sun is higher the number or rays received by any particular piece of ground is greater than when the sun is lower—i.e. the quantity of heat received by a square yard of ground increases as the sun's altitude increases.

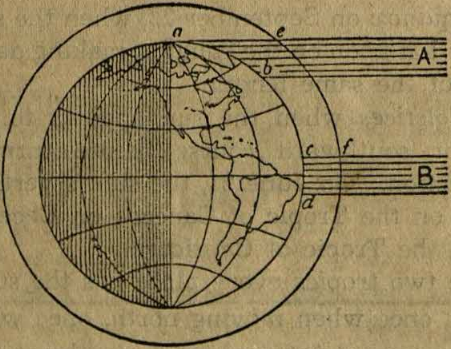


FIG. 19.—Effect of Slant Rays on Surface of the Earth.

There is still another cause which affects the temperature of the various parts of the earth at different periods of the year ; thus the time during which the sun remains above the horizon (length of day) has great influence on the temperature of the place. Hence places are most heated when the days are longest. The more distant a place is from the equator, the greater is the difference between the length of its days and nights, and the greater will be its variation of temperature during the year.

Now let us consider these observations in the light of the theories of the phenomena of Day and Night and of the seasons, as laid down by scientists.

## ROTATION AND REVOLUTION

**The Rotation of the Earth on its Axis.**—To us on the earth the sun appears every day to rise in the east, move up into the sky, and then sink down into the west. Really it is not the sun which moves, but we who are on the surface of the earth. Have you ever been in a boat crossing a river? You will remember how the land appears to be moving away upstream while you are quite still. Really it is you who are moving, the river is carrying you downstream while the land remains fixed. Similarly, when you are in a railway train starting from a station, the houses and buildings seem to be moving in the opposite direction. So though the sun *appears* to move from east to west, really it is the earth moving round on its axis from west to east. The axis of the earth is an imaginary line joining the North and South Poles through the centre of the earth. Your school globe is made so that it revolves on this axis. Notice that if we live near the equator we move round a great distance in one day, but if we could live at the North or South Pole the only result is that we should be turned round once in a day.

**Day and Night.**—Notice on your school globe that the axis of the earth is not placed in an upright position, but sloping to one side. This angle or slope, which we call the inclination of the earth's axis, is shown on the school globe for a very important reason. If you place the school globe at one end of a long table, and at the other end you put or hang a lamp exactly on a level with the centre of the earth, the lamp can represent the sun. But remember the sun is really an enormous distance away, and is very, very much larger than the earth. The point to remember is the inclina-

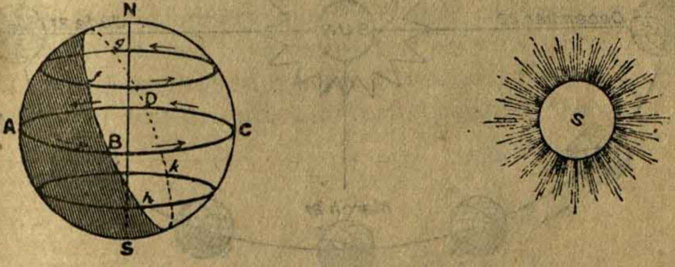


Fig. 20—How day and night are caused.

tion of the earth's axis relative to the position of the sun. When the globe is arranged thus, turn it round on its axis and notice how day and night are caused. Try and find a place on the globe which will be in the dark (*i.e.* not receiving light from the lamp) the whole time, and other places where the light falls the whole time. You will see why there are some places on the earth where, for part of the year, the sun does not set. These are often called lands of the midnight sun.

**The Seasons.** -The earth's path round the sun is called its orbit. Its orbit is nearly, but not quite, a circle so that at

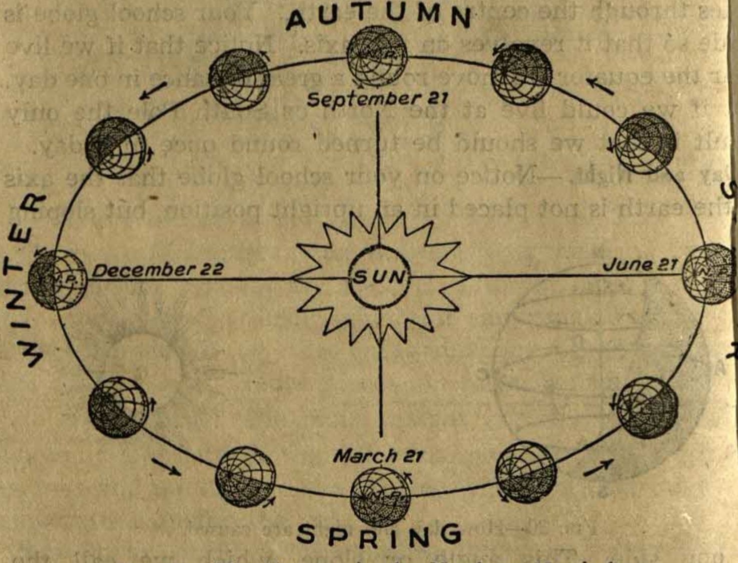


FIG. 21.—The Seasons in the Northern Hemisphere.

one part of the year the earth is slightly nearer the sun tha at other times. Although the earth moves round the su once every year, the earth's axis is always inclined in th same direction. You can best picture it by imagining th sun to be in the middle of your classroom. If you move th globe right round the room, that is, right round the sun the centre, you will be imitating the earth's movement round the sun every year. But when you move the globe, keep it so that the axis is always leaning over or inclined towards one particular end of the room. This is shown roughly in Fig. 21.

When the globe is in position *A* you will be able to find a spot which is directly facing the light, *i.e.* is directly under the sun. Rotate the earth and you will find there is a line along which all places come directly under the sun once a day, thus:

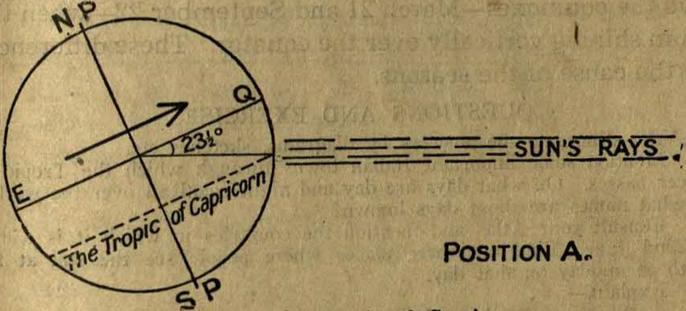


FIG. 22.—The Tropic of Capricorn.

We call this imaginary line the Tropic of Capricorn. You will find it marked by a dotted line on your globe.

When the earth is in position *C* you will be able to trace out another line in quite a different position, thus:

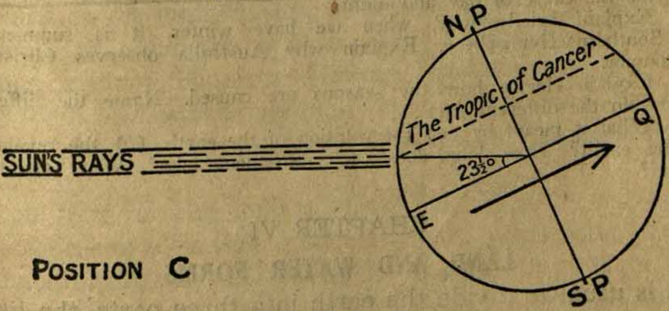


FIG. 23.—The Tropic of Cancer.

We call this the Tropic of Cancer.

When the globe is halfway between these two positions, we find that the line traced out in the same way is halfway between the two poles and is the line we call the equator.

The earth is in position *A* with the sun shining vertically over the Tropic of Capricorn on December 22, which we call the Winter Solstice. Notice that at this time a man standing at the North Pole would not see the sun at all. The sun is shining vertically over the Tropic of Cancer at the Summer Solstice, that is, on June 21. Midway between the two we have the equinoxes—March 21 and September 22—when the sun in shining vertically over the equator. These differences are the cause of the seasons.

### QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches etc.

1. Mention some important Indian towns through which the Tropic of Cancer passes. On what days are day and night equal all over the world? By what names are those days known?

2. Consult your Atlas and mention the countries in which it is winter on 22nd June. Find out three places where people see the sun at the zenith at midday on that day.

3. Explain.—

Why are the days shorter and the nights longer in winter than in summer?

Why, on certain days in the year, is the length of day and night equal?

Why are noons warmer than mornings and evenings? And why are winters not as warm as summers?

4. What proof is there that the earth rotates from West to East? Describe the cause of day and night.

5. Explain briefly why, when we have winter, it is summer in the Southern Hemisphere. Explain why Australia observes Christmas in summer.

6. Explain clearly how the seasons are caused. Name the different seasons in the different parts.

7. What is meant by (*a*) the rotation of the earth, (*b*) the revolution of the earth? How long does each movement take? What are their effects?

## CHAPTER VI

## LAND AND WATER FORMS

It is usual to divide the earth into three parts, the lithosphere or sphere of rock; the hydrosphere or the sphere of water, which girdles the greater part of the surface of the earth; and the atmosphere or air which surrounds both.

That part of the lithosphere we call 'land' is not covered by water. The surface of the earth consists of 29 per cent of land and 71 per cent of water. Now *land form* is the name given to a unit surface relief—as for example—mountain, high land, table land, plain, low land, coast.

## THE LAND

**The Continents.**—The land rising above sea-level forms the *continental area*, and amounts to $\frac{5}{16}$ths of the earth's surface. The continents are:—Asia, Europe, Africa, North America, South America and Australia. Europe and Asia in reality form but one mass, often termed Eurasia. A southern continent, termed Antarctica, is now known to exist around the South Pole.

Each continent has an axis or backbone of high land, often a plateau, and serving as a water-parting for rivers flowing to all sides.

In Eurasia the ridge of high land is situated towards the south, and runs generally east and west, so that the north-flowing rivers are long and have gentle slopes, while the south-flowing streams have a short and rapid course. In North and South America we find a high mountain ridge or plateau on the western side, near the Pacific sea-board, with low ranges near the eastern coast, leaving great central plains, drained by rivers flowing into the Atlantic. The highlands of Australia are near the coast. Africa is mostly a plateau, and has two or three chief watersheds in different situations.

The form of the land surface considered in regard to differences of elevation is termed *relief*. Low-lying regions of level or slightly undulating country not more than 1,000 feet in height are termed *plains*. Plains differ greatly in fertility according to their climate and soil. Where there is no rain, we find a sandy waste as in the Desert of Sahara. Nothing grows there except in small spots where springs

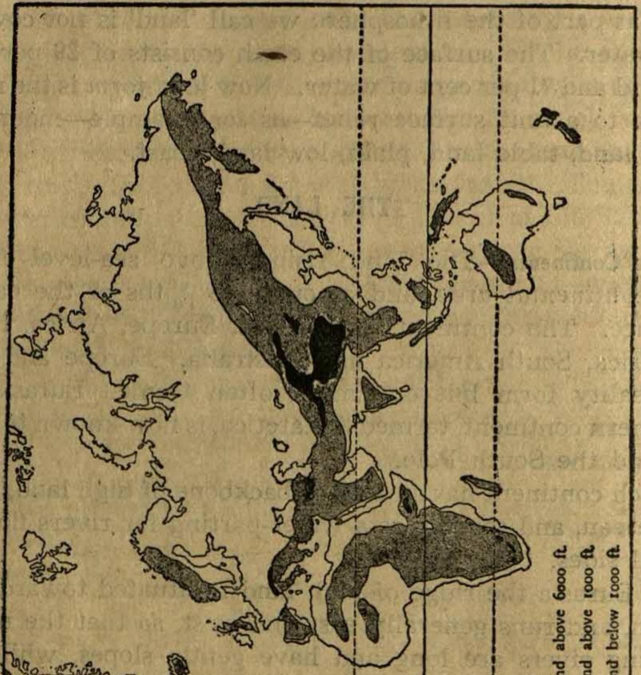


FIG. 24.—Map of the World showing Mountains and Plains.

come to the surface. These spots are known as *oases.* Many of the plains of the world have special features and are known by special names—*steppes* in South-East Russia, *tundras* in Siberia, *prairies* in North America, *llanos, silvas,* and *pampas* in South America, and *downs* in Australia.

A *plateau,* or *tableland* is a comparatively level tract of land at a considerable elevation above the sea. Prominent among the tablelands of the world are the Spanish Peninsula of Europe (average height 2,000 ft), the Abyssinian plateau of Africa (7,000 ft.), the plateau of equatorial regions near the Victoria Nyanza (3,000 to 4,000 ft.) and Tanganyika Lakes. The plateau south of the Zambezi sinks to the sea by a series of terraces called *karroos.* The Pamir plateau, N. W. of India, is mostly above 12,000 ft. and is spoken of as the 'Roof of the World.' The southern part of India contains the plateau of the Deccan. In North America, between the Rocky Mountains and the Pacific coast range called Sierra Nevada, is a vast *plateau of inland drainage* called *the Great Basin* (4,000 to 5,000 ft.). In South America lies the lofty plateau of Bolivia (12,000 to 13,000 ft.). The Mexican Tableland is from 5,000 to 6,000 feet high.

The principal mountain ranges of the world are:—The Himalayas in Asia ; the Alps, the Caucasus and the Scandinavian mountains in Europe ; the Atlas and the Abyssinian mountains in Africa ; the Rockies and the Appalachians in North America ; the Andes in South America ; and the Australian Alps in Australia.

## THE SEA

The Hydrosphere is the name we give to the envelope or mantle of water which covers a great part of the surface of the globe. The great stretches of salt water we call the oceans ; the smaller areas are seas. The great land masses are the continents, the smaller ones islands. The hydrosphere also includes lakes—stretches of water surrounded by land.

Seas and oceans occupy more than two-thirds of the whole surface and are two and a half times as extensive as all the great continents put together. The average depth of the oceans is nearly 2½ miles. We nearly always measure the depth of the water by fathoms, each fathom being 6 feet, and more exactly the average depth of the oceans is about 2,080 fathoms.

**The World Oceans.**—The oceans occupy the deep hollows of the earth's crust. Look at a map of the world coloured to show the depth of the ocean and notice that enormous stretches are between 2,000 and 3,000 fathoms in depth. The floor of the ocean is much more level than the surface of the land. There are many broad ridges where the ocean floor rises and the water is much shallower, but it is very rarely that we find steep-sided mountains or deep valleys in the ocean bed. That is because the denuding agents such as frost and running water which carve the earth's surface into mountain and valley are not at work on the ocean bed. There are certain regions where the ocean is very deep indeed, and these regions are called *'troughs'* or *'deeps'*. The most famous deeps include the Japan or Tuscarora Deep (off Japan) and the Challenger Deep in the west Pacific. The latter is so deep (5,269 fathoms) that if the highest mountain in the world were placed in it, it would still be covered by half a mile of water.

Look again at the same map and notice the fringe of shallow water up to about 100 fathoms, or 600 feet, in depth which surrounds the continents. This portion of the sea

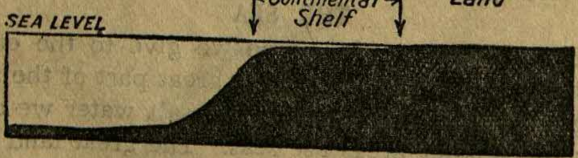


FIG. 25.—Section through a continental shelf.

floor is called the *Continental Shelf.* Sometimes it is broad, sometimes narrow. As a rule when mountains occur near the ocean the continental shelf is narrow and one passes rapidly from high land to deep water. From the edge of the continental shelf the level of the sea floor drops rapidly and the slope is called the continental slope. Study Fig. 25 carefully.

**The Oceans.** —All the oceans of the world are connected and so in talking of them all we often use the term the 'World Ocean'. Around the South Pole is the continent of Antarctica, surrounded entirely by a great stretch of water which is often called the **Southern Ocean.** From here the three most important oceans stretch northwards—the Indian, Pacific, and Atlantic Oceans.

**The Indian Ocean** is smaller than the other two and is closed in on the north by the continent of Asia. On the west is the continent of Africa, and on the east the East Indies and Australia. The Indian Ocean is thus surrounded by continents and islands on three sides. Contrast this with the other two.

**The Pacific Ocean** is the largest. It is surrounded by a rim or girdle of high mountains, and close beneath these mountain chains are long narrow troughs. The remainder of the floor is fairly level but deep, and is remarkable for the large number of small islands. The islands are mainly composed of coral, but are probably built up on volcanoes which have broken through the floor of the ocean.

**The Atlantic Ocean** is much narrower and stretches right to the Arctic Ocean without any interruption. It separates the Americas on the west from Europe and Africa on the east. Although it is so much narrower there is, running down the centre, a long ridge covered by less than 2,000 fathoms of water. On either side there are deeper troughs. There are only a few islands in the Atlantic.

**The Arctic Ocean** surrounds the North Pole. Owing to the intense cold a great part is frozen over the whole year.

### QUESTIONS AND EXERCISES

1. What do you mean by land form? Give some examples of water forms.
2. What are continents? Name the principal continents of the world, and arrange them according to their area. Which has the smallest area?
3. Name some of the noted plains on the surface of the globe. Say how they are useful to man.
4. Name the principal mountain ranges of the continents. Say how they form a barrier to movement from one part of the continent to the other.
5. What two oceans separate the old world from the new?
6. Explain what is meant by 'troughs' and 'continental shelf'.

## CHAPTER VII

## DENUDATION AND DEPOSITION

Geologists tell us that the great land forms are mainly the result of the sudden action of internal movements in the earth's crust like volcanic eruptions and earthquakes. Then continual changes are gradually taking place on the surface of the earth. They are of two main kinds.—

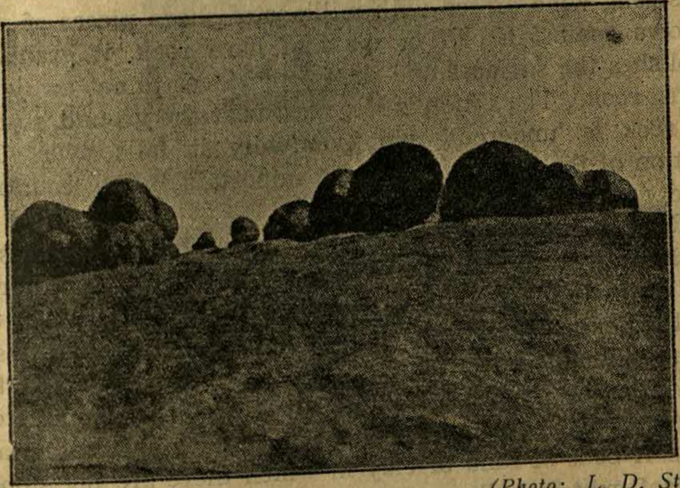
(*i*) The wearing away of the land, which we call *denudation*—a Latin word which means making naked or bare.

(*ii*) The laying down of the material in fresh places, which we call *deposition*—a Latin word meaning laying down.

### DENUDATION

As soon as dry land appears above the surface of the ocean, there are forces that wear it away. What happens during the rainy season? The rain beats down on the ground and removes loose particles of soil, so that at the end of the rains we often see tiny valleys have been cut at the sides of the roads. Waters of the great rivers such as the Irrawaddy, Ganges, Brahmaputra, or Indus, are usually very muddy. That mud has been brought by the river from far away and is being carried out to sea, where it will all be deposited. Consider now the agents which wear away the land. They are (1) the sun, (2) wind, (3) rain, (4) frost, (5) running water, (6) moving ice, and (7) the sea.

**The Sun.** —In hot countries the heat of the sun is very great during the day, and the rocks on the surface are made very hot. When most things are made hot they expand or grow larger, but some substances expand more than others. The rocks of the earth's crust consist of different substances called **minerals,** and the minerals expand at different rates. One mineral expanding more quickly



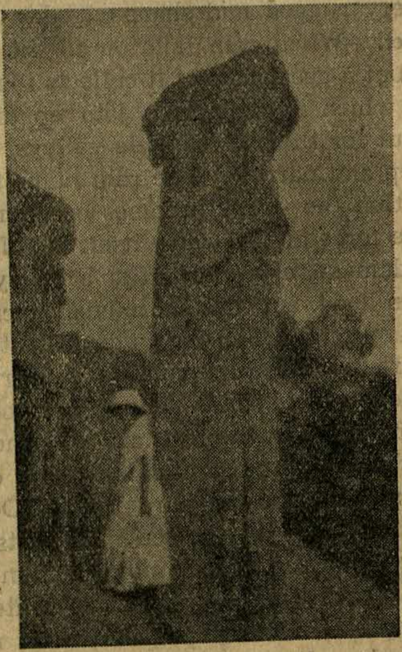
(*Photo: L. D. Stamp*

FIG. 26.—The weathering of granite, largely due to the action of the sun, Matopos Hills, Southern Rhodesia.

than the others causes the rock to burst and cracks are formed. Then at night time the rocks get very cold and contract. When this process is repeated day after day the cracks increase in size and gradually the rock breaks up into small pieces. This action of the sun is called insolation, and is important in hot dry countries.

**Wind.**—The wind acts in two ways. Strong wind blows loose particles of soil and dust away. The wind is often strong enough to blow quite coarse sand from the seashore for long distances inland. In some countries the wind blows all the soil away so that no plants can grow. There is another way, too, in which wind wears away the land. When a strong wind armed with millions of sharp pieces of sand blows against a cliff or mass of hard rock, it gradually polishes the surfaces and then commences to eat away the hard rock. The action is strongest near the ground, so that a rock is 'undercut' and eventually it falls over. The action of the wind is especially important in dry countries and near sea-shores.

**Rain.**—The rain, especially in hot countries like parts of India where there is a very heavy rainfall, has a powerful action in loosening and carrying away the soil. When the soil is bound together by the roots of trees or grasses this is more difficult, but when the trees are cut down and the hill-sides are cultivated, large areas are often completely washed away by a heavy fall of rain. When heavy rain falls on soft beds of sand or clay in which there are big stones, the soft material all round the stone is washed away, but the soft rock which is below the big stone is protected and so stands up as an earth pillar. See Fig. 27. It is picture of an earth pillar from the dry part of Burma. Rain, too, in passing through the air, absorbs a considerable proportion of carbon dioxide gas. Rain-water with this gas in solution is able to dissolve certain hard rocks such as limestone. Much of the rain-water sinks into the ground and carries on its work of solution there, forming under-ground caves. A few substances, like salt, are dissolved by pure water.



(*Photo: L. D. Stamp*)

FIG. 27.—An earth pillar in the dry belt of Burma. The rain has washed away the soft sand and pebbles except where they are protected by a mass of hard sandstone.

**Frost.**—The action of frost is important in cold countries. When the rain falls part of it sinks into the ground and fills up the cracks in the rocks. At night, when it becomes very cold, the water in the crack freezes. When water is changed into ice it expands. The force of the water in the crack, expanding when it is changed into ice, causes the crack to widen. This goes on night after niight till the crack becomes very wide, and one day when the ice melts a lump of rock breaks off. The blocks and stones thus produced by frost action are angular and sharp-edged. Frost is a powerful agent in cutting away the tops of high mountains. It causes them to be very rugged and sharp-edged.

**Running Water.** —When rain falls on to the ground some of it sinks in, but a great part of it collects together to form little streams which in their turn join up to form rivers. The streams cut for themselves little valleys, which at first tend to be deep and narrow. The rain helps to wash away the banks, so that the valley becomes broader and broader with age. The force of the water itself is sufficient to do a great deal of damage, especially after a heavy storm when the stream is in flood, but it is enormously increased by the load of stones and sand which the water collects. Big pieces of rock are hurled against one another and gradually worn into rounded pebbles and sand. The stones, too, are thrown against the hard rocks in the bed and on either side of the stream, and as a result the stream is able to cut its valley even through solid masses of hard rocks. Denudation by rivers and moving water takes place in all parts of the world except the very coldest. The denuding action of a river is greatest in its upper course, where the water is flowing down steep slopes. Rivers, like rain-water, may dissolve certain rocks such as limestone as well as wear them away mechanically.

**Moving Ice.** —In very cold countries and in high moun
tainous districts where it is equally cold, instead of river
we find solid masses of ice. These 'rivers of ice' are calle
glaciers. Like rivers, they occupy valleys. Compared wit
rivers, glaciers move only very slowly, but they do mov
Fresh snow is falling on the mountains behind them, and b
its weight pushes the glacier down its sloping valley. Th
snow is compressed gradually into ice and is added to th
glacier. The mass of ice moving downwards scoops out
valley. Great cracks called crevasses form in the mass

e, and into these cracks some blocks cut off from the surounding mountains fall and are frozen into the bottom of e glacier. There they come in contact with the hard rocks f the valley floor, of which usually one part is deeper than nother. The result is that when the glacier melts a small ake may be left.

**The Sea.** —The sea is a powerful agent in wearing away the land, especially in time of storm. Each wave hurls a great mass of water against the shore and washes away the soft parts; usually, too, the waves are armed with small stones and sand which are hurled together with the water against the shore and do still more damage. Naturally, the sea cuts away the soft rocks more rapidly than the hard. The harder parts are left as headlands, capes, and islands. Not only does the sea break away large pieces of rock from the coast, but it pounds the pieces against one another till they are worn into pebbles and sand. The action of the sea does not extend to a great depth. What has been worn away is marked roughly by the extent of the *continental shelf*. We must notice that the other agents of denudation cut the surface into hills and valleys, but the sea wears them away until a nearly *flat* surface is formed.

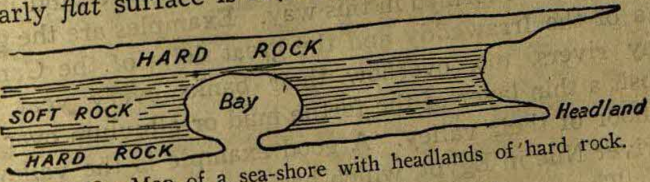


Fig. 28.—Map of a sea-shore with headlands of hard rock.

## Deposition

All the material which has been worn away from one part of the earth and carried to another is laid down again or deposited.

**Wind deposits.** —The lands in dry countries—such as parts of China and the interior of Asia—are often covered by a thick wind-borne dust called loess. The sand blown from sea-shores and in deserts is deposited as sand-dunes.

**River Deposits.**—Where a swiftly flowing mountain stream suddenly enters a flat area it often drops a great heap of mud and stones, forming an *alluvial fan*. Where a river enters on a flatter portion of its valley and the current becomes slower the river drops much of the sand it is carrying and forms sandbanks. Then there are the deposits formed where the river enters the sea. Here even the fine mud is dropped, and the salt in the sea-water has the effect of making the river drop nearly all its load. The deposits formed at the mouth of a river form a broad flat area, intersected with channels of the river itself and called a delta. Look in your Atlasses at maps showing the deltas of the Ganges, Nile, Amazon, Mississippi, and other big rivers. The mud which is dropped by a river is called alluvium. More and more alluvium is deposited until the bed of the river is entirely filled up, and the water has to find a new channel in another direction. Thus the channels in a delta are continually changing. The stretches of alluvium then form land, and indeed some of the most fertile land in the world has been formed in this way. Examples are the great delta of the Irrawaddy and the great delta of the Ganges. Many rivers, too, overflow their banks every year and deposit a thin layer of the fertile mud or alluvium over the flat floor of their valley. A good example is the valley of the river Nile in Egypt, which has been made fertile in this way. The area flooded in this way is called the floodplain. The enormous areas covered by the deltas of many rivers show you the great amount of mud brought down by rivers. Some rivers do not form deltas at their mouths, because the mud is swept away by the currents of the sea or by tides.

**Lake Deposits.**—When a river enters a lake, mud and sand are dropped until gradually the lake is filled up.

**Glacial Deposits.**—When a glacier from the mountains descends to lower levels where the air is warmer, the ice melts. At the melting end of a glacier we find deposited a mass of mud, small stones, and big boulders, which we call *moraine*. Sometimes when a glacier melts some of the moraines are left on the sides of the valley in curious positions. We call them 'perched blocks'. The moraines carried by icebergs are dropped on the floor of the ocean. There are certain places where the cold currents bearing the icebergs come in contact with a warm current and the icebergs quickly melt, so that great quantities of moraine are dropped. Such a place is found off the coast of Newfoundland and called the 'Great Banks'. Thousands of years ago part of the earth was much colder than it is at present, and great sheets of ice, and glaciers covered countries like England and North Germany where now there is no ice. These ice-sheets when they melted left behind a thick mass of clay full of big stones. We call this 'Boulder Clay'.

**Sea Deposits.** –You have already learnt something about the deposits which are formed in the sea. Near the shore we find deposits of sand and pebbles (littoral deposits); in deeper water we find mainly mud.

**Deposits from Animal and Plant Life.**—Besides mud, sand, and stones, we find deposits which are formed of the remains of animals and plants. In some parts of the world forests are found growing in very wet flat land, and when the trees die they fall into the stagnant shallow water and other trees grow up on top of the dead ones. In time the remains of the trees are converted into a rock called peat, and after long ages into coal. Peat is thus a deposit formed from the remains of plants. Peat may also be formed not from trees but from small plants called mosses. Peat mosses are common in Siberia, Ireland, and many other temperate countries. Deposits may also be formed from the remains of animals living in the ocean.

## THE WORK OF RIVERS

The work of rivers falls into three divisions:—

(1) In the swift upper course the main work is denudation or wearing away.
(2) In the middle course the main work is transportation.
(3) In the slow lower course and delta the main work is deposition.

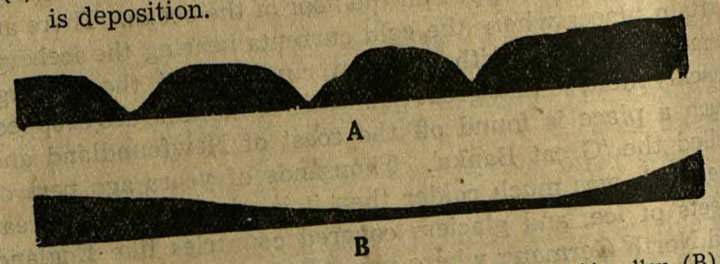


FIG. 29.—Section through young valleys (A) and an old valley (B).

When the valley is first formed it is often deep and narrow, but with time the sides are worn away by the action of rain, side streams or tributaries, and the action of the river itself, so that gradually the valley becomes broad and open as shown in Fig. 29.

In countries where there is little rain the valley may remain very narrow and deep. In this country, the great Indus has made, at one stage of its course, a way through

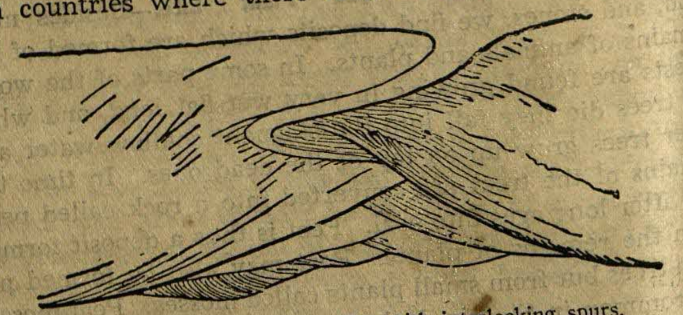
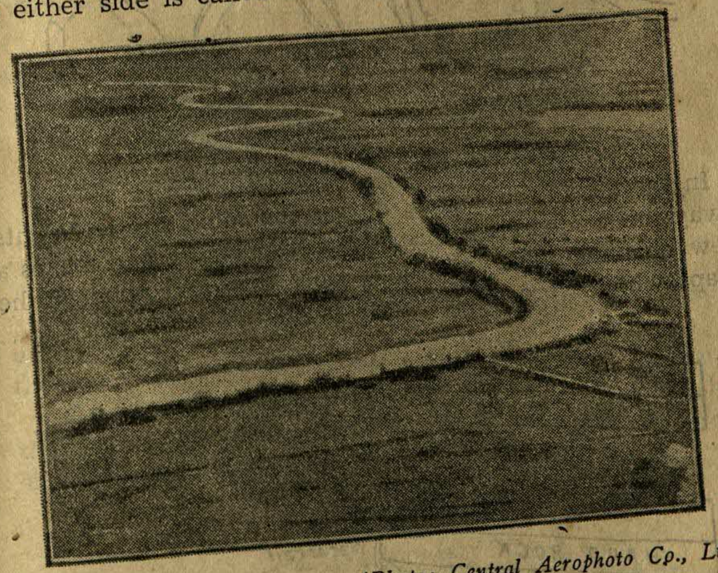


FIG. 30.—Diagram of a valley with interlocking spurs.

rocks and has formed a gorge. The Colorado river in North America is the best example of a river flowing for miles in a gorge or canyon. In the steep upper course the water finds its way by the easiest or nearest way to the lower land, but in the middle part of its course the river swings from side to side across its valley floor. River valleys are rarely straight, and if we look up a valley we notice that hills stick out from either side. A valley with small hills jutting out on either side is called a 'valley with interlocking spurs'.



(*Photo: Central Aerophoto Co., Ltd.*)

FIG. 31.—A river meandering across a peneplain.

The small hills or spurs appear to interlock because they are first on one side and then on the other. As time goes on the river cuts away the spurs on either side, and we find a broad open valley with the river wandering about from side to side. The bends of the river are called meanders. Sometimes a bend in the form of a horseshoe is formed, and the river cuts a new channel. The old channel may be left as an area of stagnant water or a lake.

Rivers which flow over broad alluvial plain like the Ganges are continually changing their course. They, too, deposit sandbanks in one place and cut a deep channel in another place. Notice from Fig. 32 how they do this.

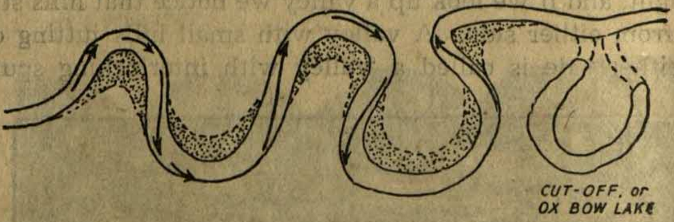


FIG. 32.—Diagram of a meandering river with sandbanks.

In the next flood season, during the rains, the river cuts away the sandbanks it formed the year before and makes a new channel. The Irrawaddy does this, and none of the maps which were made a few years ago are correct now.

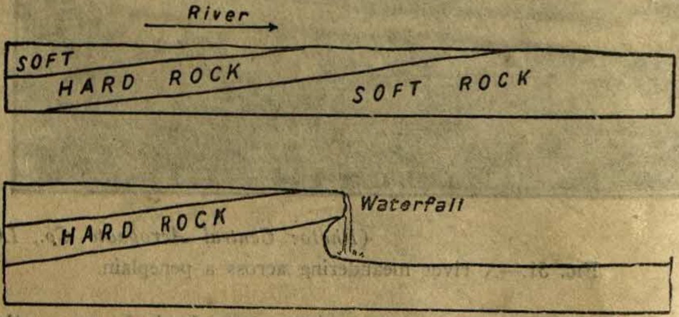


FIG. 33.—Section showing the origin of a waterfall.

You will learn later that there are both hard and soft rocks. A river is able to cut away soft rocks more easily than hard, and when a band of hard rock is reached waterfalls and rapids may be formed, as shown in the diagrams.

**River Basin.**—The whole of an area drained by a river and its branches or tributaries is called the river basin. Two basins are separated by the ridge or hills which form the watershed. The actual line separating two basins is the 'water-parting'. Some rivers drain into lakes and not into the sea at all, and their basins are called basins of inland drainage.

**The Work of Glaciers.**—Glaciers have a threefold work like rivers, but ice does not swing from side to side like water,

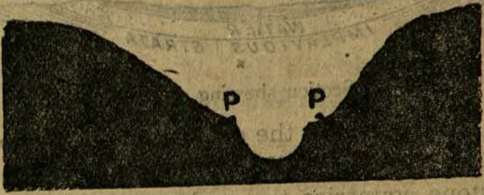


FIG. 34.—Section through a glacial valley. P=position in which perched blocks are left.

and so glacial valleys are straight and without spurs. We must note that the valley occupied by a glacier is U-shaped, that occupied by a river V-shaped.

**Underground Water.**—Some of the rain which falls upon the ground sinks into the rock beneath. The amount which sinks in depends upon the nature of the rock. Some rocks

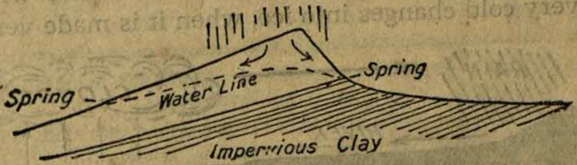


FIG. 35.—Diagram showing the origin of springs.

allow water to pass through them very easily—they are full of small cracks or holes—and are called permeable. Other rocks like clay will not allow water to pass through them and are called impermeable or impervious. You know that you can make a cup or chatty of clay and it will hold water.

See what happens when the rain-water sinks underground and meets an impermeable rock. It will then travel along the surface of the latter and find its way out on a hill-side as a spring. Such a spring often forms the source of a river. See what happens when the rocks are bent into a hollow curve, or a '*syncline*'. The water is trapped in the centre, and by putting a well in the centre we get a good supply of water. Such a well is called an artesian well.

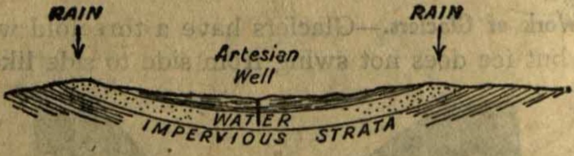


FIG. 36.—Section showing an artesian basin.

In limestone countries the underground water is able to dissolve some of the limestone, and so caves are formed. Limestone caves are also remarkable for 'stalactites' and 'stalagmites'. As the water trickles through the roof, some of it evaporates and a little of the limestone it has dissolved is deposited, and in time masses hanging from the roof, are formed—these are called *stalactites.* A similar deposit found on the floor forms the *stalagmite.*

**The Water Cycle.**—You all know that water when it is made very cold changes into ice, when it is made very hot it boils and passes into steam. On a sunny day a pool of water on the road quickly dries up and disappears. When a puddle of water appears to dry up like this, the water really is

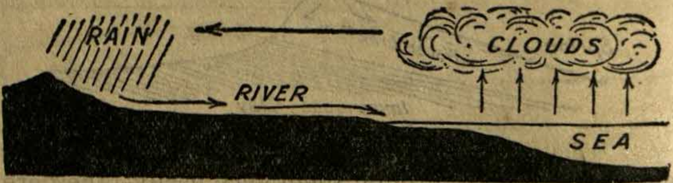


FIG. 37.—The Water Cycle.

changed into a gas—called water vapour—and passes into the atmosphere. Just think what changes are continually happening to the waters of the earth. Over the ocean, especially where it is hot and the sun is shining, great quantities of water are evaporated and pass into the air as invisible water vapour. The air rises and cools, and the water vapour condenses to form clouds. The clouds are blown on to land masses and the water falls to the earth as rain or snow. Much of the rain-water collects to form streams and rivers which carry the water back into the sea. There is, then, a movement of water in a circle, starting from the sea and finishing in the sea. We call this the 'Water Cycle'.

## VOLCANOES AND EARTHQUAKES

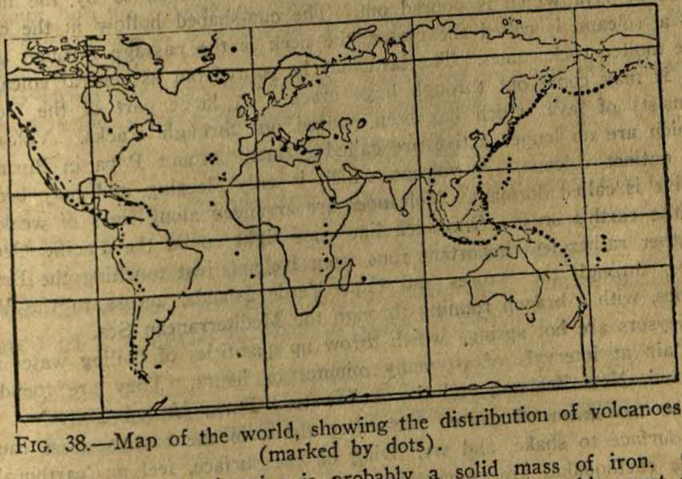


FIG. 38.—Map of the world, showing the distribution of volcanoes (marked by dots).

We learnt that the interior is probably a solid mass of iron. Outside this is the lithosphere. As we go down in the earth's crust from the surface—as when we descend a mine—it gradually becomes hotter and hotter. At great depths it must become so hot that the rocks would be molten. For the most part, however, the rocks must be kept solid because of the great pressure. So we can picture the solid earth's crust on which we stand as a thin shell below which are rocks very, very hot indeed. But the shell is not equally strong all over. There are weak places or even cracks. When the crust gets weak the pressure is less, and the underground parts become molten and begin to move. The movement of molten rock underground causes the solid crust to shake, and so we have earthquakes. Sometimes the molten rock finds its way to the surface and is poured out as a *volcano.*

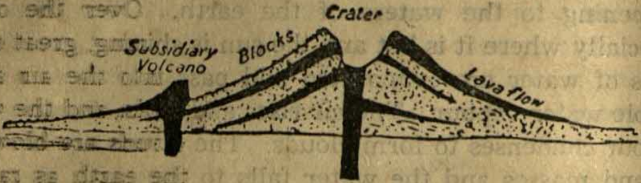


FIG. 39.—Diagrammatic section through a volcano, Mount Popa, Burma.

When the molten rock first bursts through, it often does so with great violence. Great clouds of steam are emitted, and dust and ashes are thrown far into the air. The ashes fall back to earth and build up a mountain near the opening. This mountain is added to by the molten rock or lava which is poured out. The cup-shaped hollow in the centre of a volcano is called the crater, the neck is the passage through which the molten rock comes. The lava may be poured out as several volcanoes, or it may come out through huge cracks. A large part of the Deccan consists of lava which has been poured out through cracks. Volcanoes which are no longer active are called extinct. Mount Popa in Burma is an extinct volcano. A volcano which is only sleeping and may become active is called dormant. Volcanoes are arranged along lines of weakness in the earth's crust. One such line runs right round the Pacific Ocean; another rather less important runs from Ireland, just touching the British Isles, through the Azores and Cape Verde Islands, across to the West Indies, with a branch running through the Mediterranean Sea.

Geysers are hot springs which throw up quantities of boiling water into the air at intervals of so many minutes or hours. They are found in Iceland, New Zealand, and the Yellowstone Park, United States.

The movement of molten rock deep down in the earth's crust causes the surface to shake, and we, living on the surface, feel an 'earthquake'. Some earthquakes are connected with volcanic eruptions, but much more important are the earthquakes which result from the movement of material underground which we cannot see. Like volcanoes, earthquakes usually occur along weak places in the earth's crust. Some of them are actually connected with cracks in the crust. These cracks are called 'faults', and often after an earthquake the rocks on one side of the fault are seen to have moved up, and on the other side to have moved down, leaving a small cliff. After the great San Francisco earthquake in 1906 it was impossible to travel along some of the roads, because there was a sudden drop of 6 or 10 feet where the road had been cut by a fault.

RESULTS OF EARTHQUAKES.—After the great Japanese earthquake of September, 1923, it was found that some parts of the land had moved up so that areas of land appeared which were before covered by the sea, but other places which were formerly dry land sank below the level of the sea. Before the earthquake the sea in the Gulf of Tokio was in places 2,500 feet deep; after the earthquake it was only 500 feet, showing that the floor of the sea had risen—the enormous amount of 2,000 feet. In 1819 a great earthquake occurred in India, and an enormous tract of land near the Rann of Cutch sank below the level of the sea.

With a succession of earthquakes the changes produced may be very great indeed. We see that there are three principal results of earthquakes:—

(1) The surface of the earth is folded; some parts move up and others move down, producing arches and hollows. The arches are called 'anticlines' and the hollows 'synclines'.

(2) Along cracks or faults the rocks are moved up on one side and down on the other.

(3) Large areas may be lifted up above sea-level so that they become dry land; other areas of dry land become covered by the sea.

## MOUNTAIN BUILDING

The two most important kinds of mountains are fold mountains and block mountains. Both kinds are produced by a long series of earthquakes. Let us see how.

**Fold Mountains.**—As a result of one earthquake a level stretch of the earth is gently folded like this:

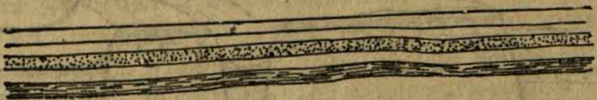


Fig. 40.

The next earthquake may make the folds much greater so that they become like this:

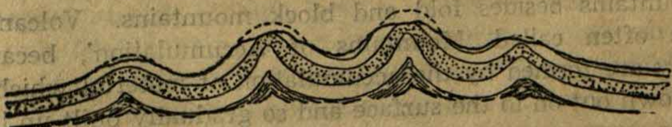


Fig. 41.

Later the rocks are still more folded like this:

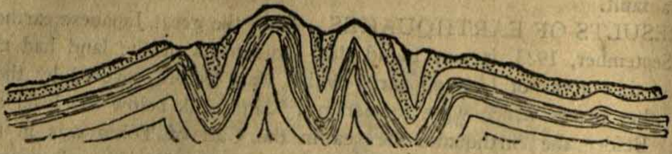


FIG. 42.

One part is ridged up to form mountains often of great height, while the other part is covered by the waters of the ocean. Mountains formed in this way are by far the most important in the world—the Himalayas, Alps, Andes, Rockies, etc. They usually form long lines or ranges of mountains, such as the great chain which runs along the continent of America from north to south. Of course it takes a long time and a great many earthquakes for such a great mountain chain to grow.

**Block Mountains and Rift Valleys.**—We learnt above about faults or cracks. Sometimes a big mass of land is pushed up between several cracks and so forms a mountain which we call a block mountain. Sometimes a long narrow piece of the crust is let down between two parallel cracks and forms what is called a rift valley.

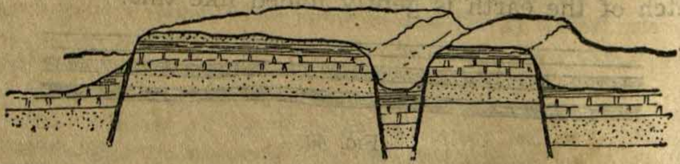


FIG. 43.—Diagram of block mountains and rift valleys.

**Mountains of Accumulation.**—There are other kinds of mountains besides fold and block mountains. Volcanoes are often called 'Mountains of Accumulation', because they are formed by the accumulation of material which is thrown out on to the surface and so gradually built up into hills.

**Mountains of Denudation.**—You have learnt how the agents of denudation gradually wear away the surface of the land. As soon as block mountains or fold mountains are formed, they begin to get worn away. Sometimes only a small piece of the original block mountain may be left, all the rest being worn away. Such a fragment left behind is called a mountain of denudation.

Notice, then, that you can classify mountains into four groups.

**Slow Movements of Elevation and Depression.**—A single earthquake may produce a considerable change, and several earthquakes may result in great changes although no mountains are formed. In many parts of the world the land is steadily rising or sinking. In some parts of the world beds of sea-shells are found high above sea-level; in other parts the remains of forests are found covered by the sea. This shows that the land is rising in some parts and sinking in others.

**Peneplains and Plateaux.**—The sea is the most important agent which wears away a flat surface (the surface of the continental shelf). If part of this surface becomes raised into dry land, it forms a peneplain. The word 'peneplain' means 'almost a plain'. A peneplain may also be formed by rivers. When a river becomes old it swings from side to side, and gradually the valley sides are worn away and almost disappear. The ridge between one valley and the next can scarcely be seen, and the whole surface of the land is almost a plain—a peneplain.

The movements of elevation may cause a large area to be raised a considerable area above sea-level. Such a big flat-topped stretch of high land is called a plateau. The sun, rain, frost, running water, and ice commence to wear it away. If the rocks are soft they will be worn away quickly, but if they are hard they are removed but slowly. But eventually the plateau will be worn into a series of mountains and valleys. Only the tops of the mountai remain approximately on a level to remind us that th was once a plateau. Such a region is called a 'dissect plateau', and the Deccan of India is an example.

## ROCKS

The materials making up the crust of the earth a called rocks. We can classify them into three main grou according to the way in which they have been formed.

(*a*) **Sedimentary or Stratified Rocks** are those whi have been laid down in beds or layers (strata) by win running water, or the sea. They are in many ways the mo important. Animals or plants may sometimes be buri and their hard parts may remain. When afterwards t sediments are raised by earthquakes into dry land we ma find sea-shells, etc., far inland. We call such remai 'fossils'. We can divide sedimentary rocks into three ve rough groups:

(i) Alluvium, which is still being formed by river

(ii) Young soft rocks which have not been subject to great earthquakes or mountain-building movements. is in such rocks that oil is found.

(iii) Old hard rocks which have been bent, folded, a cracked by many earthquakes and often raised into hig mountains.

*Organic Rocks* are rocks formed of the remains animals or plants (organisms). Coal is an organic ro which is formed from the remains of forests which ha been submerged and then buried. Mineral oil has also be formed from the remains of animals or plants buried whe a river deposited its load of mud in the sea or a lake. must remember that coal and oil are *always* found in sed mentary rocks. If we come to a country where the rock are *not* sedimentary, it is quite useless to look for coa Many limestones are organic rocks because they are bu of the hard parts of animals in the sea. Coral is an ample.

(b) **Igneous Rocks,** which means literally 'fiery rocks', e those resulting from the interior heat of the earth. iere are two main kinds.

(i) Those which reach the surface in volcanoes and are lled *volcanic rocks.* Great areas of rock in the Deccan ound Bombay have originated in this way.

(ii) Those which moved underground but became solid efore they reached the surface. A good example of these ocks is granite. Such rocks are usually hard and resist eathering. They are called *Plutonic rocks.*

(c) **Metamorphic Rocks**—literally rocks which have hanged their forms'. Earthquakes bend and fold the arth's crust and gradually build up great mountains. In he process the rocks are hardened and changed. Other ocks become buried by the fresh layers piled on top of them nd may be altered by the great heat in the lower part f the earth's crust. Deep in the earth the rocks may be altered far more, and it is almost impossible to tell what the original rock was like. We call such rocks *metamorphic* or crystalline rocks. It takes a long, long time for rocks to become changed like this, and some of the areas of crystalline rocks were formed ages and ages ago and have remained unchanged ever since. The Deccan of India is a good example. Metamorphic rocks, like igneous rocks, are usually hard and so resist weathering.

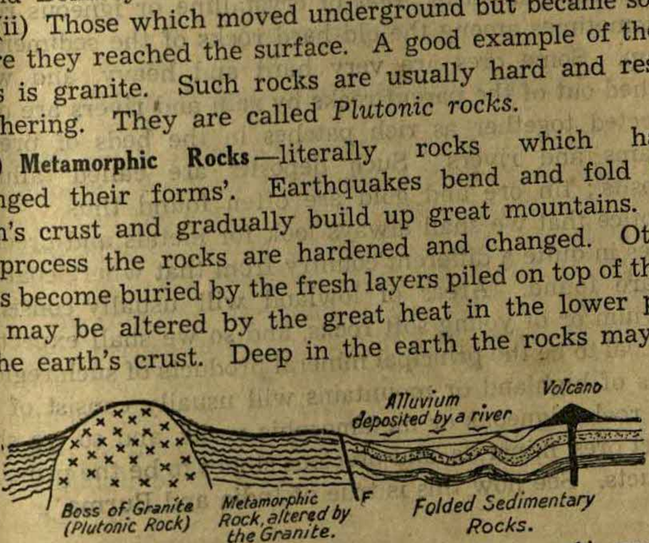

Volcano
Alluvium deposited by a river
Boss of Granite (Plutonic Rock)
Metamorphic Rock, altered by the Granite.
F
Folded Sedimentary Rocks.

FIG. 44.—Diagrammatic section through part of the earth's crust showing different kinds of rocks.

## RELIEF, ROCKS AND MINERALS

**Ores and Precious Stones.**—Nearly all the ores of th valuable metals originate in the hot lower layers of th crust. The ores find their way up to the surface throug cracks. Other ores and precious stones are formed whe rocks are metamorphosed or changed. Thus we look fo the precious stones and metals such as gold, silver, coppe lead, zinc, and tin in areas of crystalline or igneous rock or sometimes among the old hard rocks of the sedimentar group. Some ores are very hard and heavy, and whe washed out of the parent rocks by rain and rivers are ofte collected together as rich patches in the beds of presen streams and rivers. Such deposits are called 'alluvia deposits'; tin ore and gold are often found thus.

Notice that we shall always look for metals and preciou stones in quite a different country from that where coal an oil are found. Areas of lowland will usually consist o alluvium or of young soft rocks, and so we shall expect oi and coal to be the principal mineral products of such region Areas of highland or mountains will usually consist of ol hard rocks, igneous or metamorphic rocks, and so we shal expect ores, minerals, and precious stones to be the principa products. See how this is true of India and Burma.

### QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches, etc.

1. (*a*) Name the principal land forms.

(*b*) Explain the terms; Lithosphere, Ridge, Peneplain, Glacier, Gorg or Canyon, a Valley with interlocking spurs. Fold-mountain, Rift valley Metamorphic rocks, Relief, Erosion.

2. (*a*) How are mountains formed? Give examples.

(A. V. H. S. Bur. 1925)

(*b*) How are plains and plateaux formed? Give examples.

3. What are sedimentary rocks? In what ways may they be formed and how do they come to form part of the land masses?

(U. C. R. J. I. 1926)

4. What do you understand by 'Denudation'? What are the chie agents of denudation? Briefly describe their action.

(B. U. 1934)

5. Describe the work of running water as an agent of denudation and deposition. Compare and contrast the work of a river with that of a glacier.

6. What is meant by 'Deposition'? What are the chief agents that do this work?

7. What is a volcano? How is it formed? Where are many volcanoes to be found on the earth's surface?

8. What are the known causes of earthquakes? What are the chief results of earthquakes? Mention the areas where earthquakes are frequent. (B. U. 1934)

## CHAPTER VIII

# CLIMATE AND FACTORS OF CLIMATE

**Weather.**—We have now learnt quite a lot about the atmosphere. We have learnt about pressure and the barometer, about temperature, winds, moisture, rainfall, etc. If we think of any one day, all these things put together make what we call the Weather. Sometimes one seems more important than the other and we can say it is wet weather to-day, or perhaps it is very cold weather, or cloudy weather. We talk, too, about the weather for the week or month. Sometimes for a whole week we may have very stormy weather. In India the weather does not change very quickly. In the middle of the Cold Season we sometimes have a wet day, but not very often. In other countries such as the countries of Europe every day may be quite different. In England one day may be wet and cold, the next day cloudless, sunny, and quite hot. In such countries everybody is interested in the weather and many of the newspapers publish every day little maps (called weather charts) showing the state of the weather. In India sailors have to watch the weather for storms, and it is important to paddy growers and other farmers.

**Climate.**—Climate is the average of the weather. We must be quite sure we understand what that means, because climate is one of the most important subjects in geography.

In India, we have a 'Monsoon Climate'. There we divide the year into Cold Season, Hot Season, and Rainy Season. Every year there are these three seasons. In some years the rain during the rainy season is very abundant and we say the monsoon is heavy; in other years not nearly so much rain falls. But that does not make any difference to the truth of the statement that every year has its rainy, cold, and hot seasons. Sometimes we may have a hot day in the midst of the rains, and we can say that the weather for that day is exceptional. But one exceptional day does not alter climate, because the climate refers to the normal or usual condition of the weather. If we observe every year carefully for many years the amount of rain which falls during any particular month or during the rainy season, we can get the *average rainfall*: in the same way we can find the average temperature, pressure, humidity, wind direction, etc. for a month, for a season, or for the year—all these averages considered together will tell us of the *climate*. So you see that *weather* refers to a short period such as a day or a week, but *climate* refers to the normal condition of things over many years. The whole of India speaking broadly, has a monsoon type of climate and has the same three seasons, but some parts are much wetter than others. When we deal with India in detail we shall be able to divide the country up into smaller regions according to climate.

## ISOTHERMS

Isotherm is a word which means 'equal heat' or equal temperature. An isotherm is an imaginary line drawn through all places having the same temperature at the same time. We can have isotherms for daily temperatures, monthly temperatures, yearly average temperatures, etc. The most important in geography are the mean monthly isotherms, especially for January and July. For example

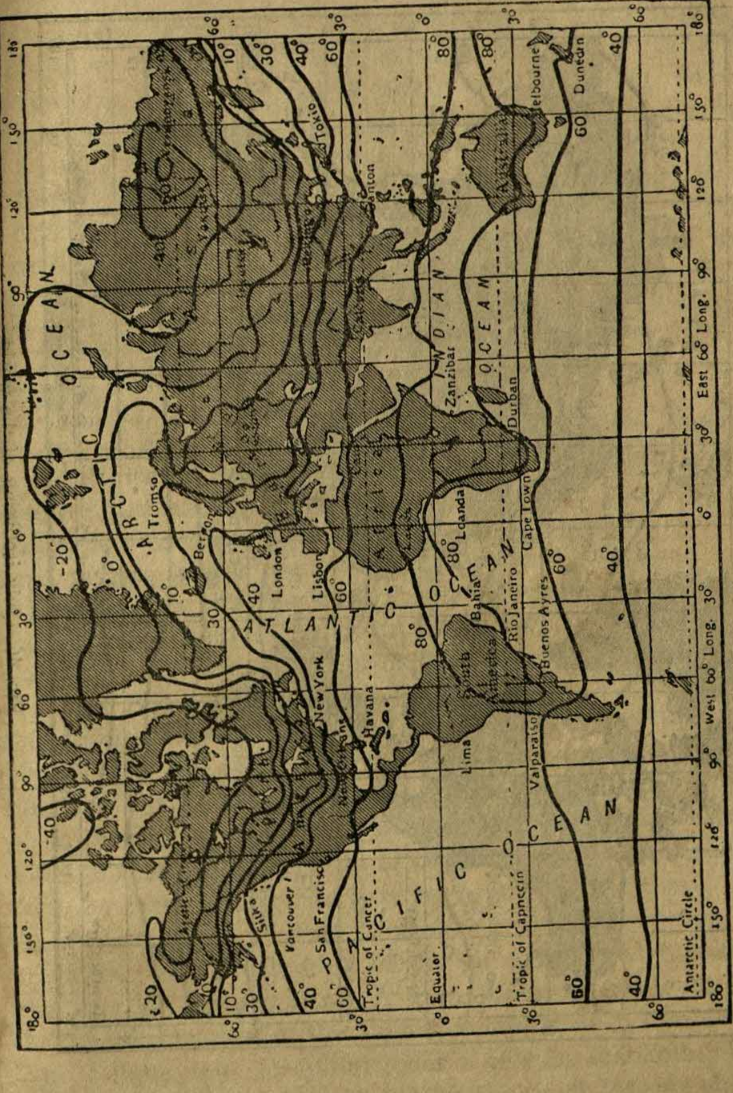


FIG. 45.—January isotherms of the world.
*(From Longmans' "Geographical Series", Book III.)*

of the blankets, and only had a few above to keep him warm. The earth is heated by the sun, but where the blanket of air is thin the warmth is quickly lost. The higher we ascend, the fewer molecules there are to absorb the heat rays radiated from the earth. Roughly we find that for every 300 feet we climb upwards the temperature drops 1°, so that a place 3,000 feet above sea-level will have a temperature 10° lower than a place nearby on the plains.

The temperature of every place in the hills can be reduced to what is called a 'sea-level equivalent' thus:— The average January temperature of Simla is 39°F. But Simla is 7,200 feet above sea-level. If we could imagine Simla to be at sea-level it would have a temperature in January of $39^\circ + \frac{7200}{300}$, or $39^\circ + 24^\circ = 63^\circ$F. This is the sea-level equivalent. Again, Bangalore has a January temperature of 70°, and is 3,000 feet above sea-level. If Bangalore could be brought to sea-level it would have a January temperature of $70^\circ + \frac{3000}{300}$, or $70^\circ + 10^\circ = 80^\circ$F. 80°F. is then the sea-level equivalent.

## FACTORS OF CLIMATE

**Latitude.**—At and near the equator the mean yearly temperature is just over 80°F., in latitude 30° an average of about 68°F., and in latitude 50° an average of 43°F. Thus, *the mean temperature of the air*, which is *the main element of climate, diminishes with increase of latitude.*

*Latitude*, again, *has an important effect on the annual range of temperature* (i.e. the difference between the mean temperature of July and January, to take the hottest and coldest months of the year). Study figs. 45 and 46. The reasons for this difference in the range of temperature are:—

(1) difference between the length of day and night during the course of the seasons (see p. 26).

(2) places receive heat during the day, and lose it by radiation during the night and hence, the farther we go from the equator the greater is the difference between the amount of heat received in summer and that received in winter.

Range of temperature, then, is an important element of climate, for it has great effect on both animal and vegetable life as we shall see later.

We have, thus, come to know that latitude is a potent factor of climate.

Consider, however, the following figures showing the *actual* range of temperature at places on different latitudes:—

| *Place and Location* | | *Latitude* | *Range* |
|---|---|---|---|
| Paramaribo | (Dt. Guiana) | 5°50′N. | 4° |
| Key West | (Florida) | 24°33′N. | 14° |
| Lisbon | (Portugal) | 38°42′N. | 21° |
| Portland | (Maine) | 43°40′N. | 47° |
| Dublin | (Ireland) | 53°20′N. | 23° |
| Moscow | (C. Russia) | 55°75′N. | 49° |
| York Factory | (Hudson Bay) | 57° 7′N. | 40° |
| Yakutsk | (Siberia) | 62° 2′N. | 105° |
| Reikjavik | (Iceland) | 64° 8′N. | 24° |

From a close examination of the above figures we see that in the cases of Dublin and Reikjavik we see exceptions to the generalization that the annual range of temperature is determined by the latitude. So there must be other causes besides latitude which affect not only the mean annual temperature, but also the range of temperature.

Were the earth covered entirely with water, or entirely with land of uniform height, latitude alone would regulate temperature and other atmospheric conditions. But there are, in addition, the different heat properties of land and water, the effects of ocean currents of warm and cold water, and the effects of prevailing winds.

**Influence of the Sea on Climate.**—The water surface is more slowly heated and more slowly cooled than the land surface. This gives rise to three classes of climate—*oceanic*, *insular* and *continental*.

*Oceanic Climates* are only to be found in the open sea or on small islands. Owing to ever-blowing breezes from the sea, some of the island groups in the Pacific, even within the Torrid Zone, enjoy a most equable climate, the thermometer not varying more than 5 or 6 degrees during the twelve months.

*Insular* or *Coastal Climates* are those in which the annual range of temperature is small because of the presence of the ocean. The yearly range seldom exceeds 30°F. (e.g. Great Britain.)

*Continental* or *Land Climates* are found in inland parts of extended land surfaces, in which there is a great range of temperature from summer to winter (e.g. Central Russia).

**Effect of Currents on Climate.**—The air over a warm current is kept warm, and the air over a cold current is cold. Consequently lands which are under the influence of a warm current have a much milder climate than places in the same latitude which are bathed by a cold current. Look at Fig. 58 and from your atlas find the position of Labrador, Vancouver and the Island of Sakhalin. The sea round the British Isles is never frozen because of the warm North Atlantic Drift but the coast of Labrador in the same latitude is ice-bound for three-quarters of the year. Vancouver is always free from ice, but Sakhalin is surrounded by ice for a great par of the year. Why is this? New York (latitude 40°N.) owing to the Cold Wall, has much colder winters tha London although London (latitude 51°N.) is much farthe north. Indeed, the waters of New York Harbour in winte are as cold as those of the North Cape in Norway (latitude 71°N.).

Where cold and warm currents meet dense fogs are common, as for example, off the Great Bank of Newfoundland, where the cold Labrador Current meets the warm waters of the Gulf Stream. The icebergs floated along by the cold currents help to keep the air cold. As the icebergs are often hidden by the fogs, the danger to ships is very great. The *Titanic*, then one of the largest ships in the world, was lost in 1912 through collision with an iceberg hidden by fog. Violent storms are caused by differences of temperature due to the meeting of cold and warm currents. The hurricanes which occur off the coast of the United States follow the line where the Gulf Stream and the Cold Wall meet. The Typhoons of the Pacific follow the course of the Japanese Current.

**Influence of Prevailing Winds**—Over a warm sea-current the air is warm; over a cold current the air has little moisture and is cold. The south-westerly winds that come across the wide Atlantic and strike the shores of Britain and North-western Europe bring warmth and moisture with them. So the western sides of Britain and Scandinavia receive heavy showers of rain. During condensation a large quantity of latent heat is set free. This helps to raise the temperature of the air.

On the contrary, during a part of the winter northerly blasts from the higher latitudes of North America often produce winters of excessive severity.

Where the prevailing winds are westerly, and where currents of warm water are flowing in the same direction from the equator, the cold of winter is greatly mitigated. (Note that in Fig. 45 the isotherms bend towards the pole.) On the east coasts of Asia and America, however, the prevailing winds are northerly and cold, so that there is a great difference between the summer and winter temperatures.

Thus the *west* coasts of continents enjoy an *insular* climate, while the *east* coasts and the inland districts endure the more trying continental climate.

**Effect of Elevation on Climate.**—In ascending a mountain from the sea-level to the limit of perpetual snow, we pass through the same series of climates, so far as temperature is concerned, which we should do by travelling from the same station to the polar regions of the globe.

Thus the mean annual temperature of Quito, situated nearly on the equator at an altitude 9,300 feet, on the Andes is only 56°F., and peaks as Kilimanjaro (20,000 ft.), Kenia (18,500 ft.) and Ruwenzori (16,600 ft.) close to the equator, have their tops covered with everlasting snow. For the same reason we find that inland tablelands have a lower mean temperature than places at the sea-level in the same latitude, and have a great range of temperature. Thus the range at Madrid (2,150 ft.) is 36°F. while that at Lisbon i only 20°F.

*Mountains act as condensers of moisture*, and hence experience increase of rainfall with elevation. Mount chains at right angles to the prevailing winds have a m side on the winward slope and a dry side on the leew slope (rain-shadow).

Mountains also afford shelter from cold winds, e.g Himalayas and the Alps protect the Ganges valley an Po valley respectively from the cold winds from the

**The Slope of the Ground**—A portion of land sloping to the south in the Northern hemisphere receives the rays more perpendicularly than land sloping nor England fruits grow best on a 'southern aspect', i Zealand on a 'northern aspect'.

e **Nature of the Soil.**—A sandy waste like Sahara ab- s a great quantity of heat during the day and radiates dly during the night. Wet and marshy grounds lower mean temperature. Cultivation and drainage makes a nate warmer and more salubrious (e.g. in the Fen district England). Forests attract and hold moisture, and a estruction of forests lowers the rainfall of a district after ome years.

**Summary.**—Climate, we have learnt, varies from place to place. Let us here recall the factors which go to make up climate and modify it; for these will be necessary when later we shall consider the principal types of the climate of the world. You have learnt the factors that cause changes in temperature, moisture, and air-pressure; and the factors of climate are no other but these stated together, and here they are:—

(1) Latitude or distance from the Equator.

*The nearer the equator a place is, the hotter it is; while the farther from the equator the place is, the colder it is.* Madras is hotter than Bombay and Bombay is hotter than Karachi. The average temperature of Bombay is about 80° while that of Karachi is 77°. The countries in the tropics have a hot climate. Note that the sun is shining north of the equator from 22nd March to 22nd September and south of the equator during the rest of the year. The heat belt of the world naturally swings north and south from the tropic of Cancer to the tropic of Capricorn.

(2) Altitude or height above sea-level.

*The higher a place is (above the sea-level) the colder it is; and the lower the place is, the hotter it is.* Mahableshwar is colder than Poona and Lahore is hotter than Simla. Plains are hotter than tablelands or mountains. Temperature falls at the rate of nearly 1°F. per 300 feet of altitude.

### (3) Distance from sea.

*The nearer to the sea a place is, the more equable* (coole *in summer and warmer in winter*) *the climate is; and th farther from the sea the place is, the more extreme* (*very ho in summer and very cold in winter*) *the climate becomes* Bombay in May is cooler than Nagpur, while Nagpur i colder than Bombay in January. Places near the sea ar said to have an oceanic (equable) climate and places inland a continental climate. At places inland, there is a greate range of yearly temperature than at coastal places. A Delhi the temperature in June is 92°, while the Januar temperature is about 57°. So the range of temperature a Delhi is 92° — 57° = 35°. At Bombay, June temperature i 81° and that of January is 77°, so the range of temperatur is only 4 degrees. The sea being a great equaliser o climate, islands have an equable climate.

### (4) Prevailing Winds.

Prevailing winds modify the climate of a country, e.g. those that blow from the land make the climate *dry,* and those that blow from the sea make it *damp.* Bombay i damp in July owing to the monsoons, but dry in January.

### (5) Ocean Currents.

You have learnt how ocean currents, too, equalise tem-perature. The Gulf Stream has made the climate of Britain warm while Labrador, nearly on the same latitudes, remains frozen for the great part of the year owing to the cold Labrador Current.

### (6) Position and Direction of Mountain Ranges.

Mountains deflect winds. The Himalayas check the cold winds from the north blowing over the plains of Hindustan. In the case of mountains facing the sea, the rainy region will be on the windward side and a rain-shadow or rain-screen region behind. There is heavy rain in places like Bombay on the coastal strip of the Western Ghats, while places in the Deccan like Sholapur and Ahmadnagar are dry.

(7) Nature of Soil.

Sandy or rocky soil heats quickly and also cools quickly. In Rajputana, because of its sandy soil, it is very hot during the day and very cold at night. On rocky soil, the rainfall runs off quickly—and is not retained. In the Deccan, where the soil is rocky, the climate remains dry. Alluvial soil like that of the Gangetic Valley equalises climate. Patna has an annual range of temperature of 20 degrees, while Jacobabad in the same latitude has as much as 40 degrees.

(8) Amount of vegetation.

Vegetation equalises climate. Egypt is much drier to-day owing to the destruction of its vegetation than it once was. Forests, too, equalise climate by helping to retain moisture in the soil. The climate of certain parts of the Southern Maratha Country in the Bombay Presidency, where forests have been cut, has become drier.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches, etc.

1. What is atmosphere composed of and to what extent does it extend?
2. How is temperature measured and recorded? What is meant by an isotherm map? (A.V.H.S., Bur., 1026)
3. What are isotherms? Why do they not coincide with parallels of latitude? How do the directions of isothermal lines in India change their position as we pass from winter to summer and why?
4. Explain why:—
    (*a*) Isotherms generally run in an east to west direction but in Great Britain they run almost north to south in winter.
    (*b*) Quito, though on the equator, has a temperate climate. (B. U. 1930)
    (*c*) Days are very hot and nights are very cold in the desert areas. (B. U. 1928)
    (*d*) Slanting rays give less heat than direct rays.
    (*e*) Mornings and evenings are cooler than noons.
    (*f*) Kilimanjaro, on the equator, is snowclad.
    (*g*) Edinburgh has a milder climate than Moscow though in the same latitude.
    (*h*) The North Pole is not the coldest place in the Northern Hemisphere.

(*i*) It is commonly observed that a clear night is cold, whereas cloudy night is warmer.

(*j*) New York has a range of nearly 40 degrees between th average January and July temperatures, whereas London has a range 24 degrees.

## CHAPTER IX

## ATMOSPHERIC PRESSURE, WINDS, AND RAIN

We are now going to study an important characteristic the air, viz., that it can be compressed. When you pump a bicycle tyre or a motor tyre you are squeezing a great de

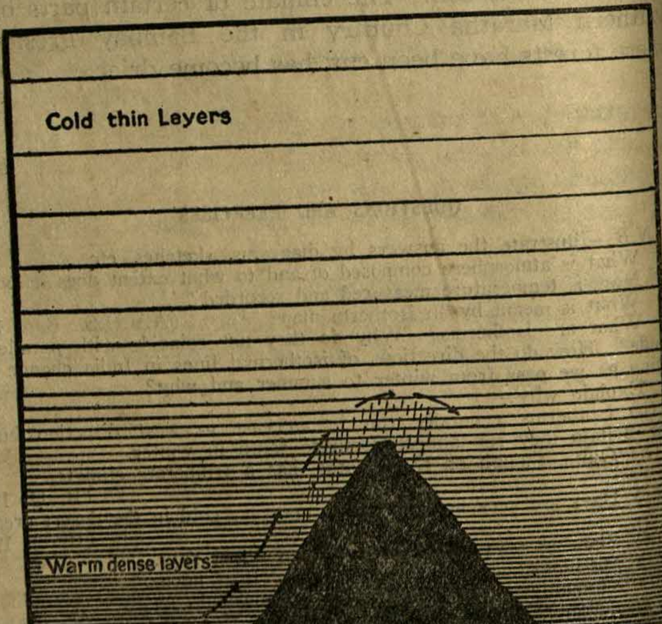


FIG. 47.—Diagram showing the layers of the atmosphere.

of air into a small space. Then, too, air has weight. Now the earth is a ball surrounded by a coat or envelope of air—the atmosphere. The coat is about 200 miles thick, and the upper layers are pressing down on the lower layers in which the air is dense and heavy; whilst in the upper layers it is thin or rarefied, although you do not feel it. The column of air is exerting a pressure equal to 15 lbs. on every square inch of your body. A bicycle tyre does not burst because it is made to stand a great pressure of air inside; in the same way your body is made to withstand this pressure and you do not notice it. But people who climb high mountains, where the air is thin, find it very difficult to live and breath. On the top of Mount Everest (29,141 ft.) the pressure is much less than one-fifth what it is at sea-level, and it is almost impossible to live at such a height even for a short time.

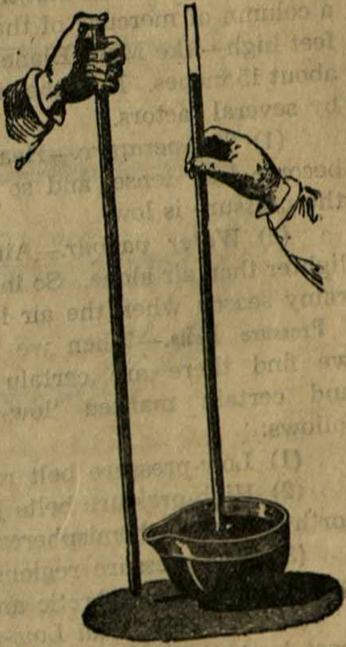


FIG. 48.—Diagram of a barometer.

Even at sea-level the pressure is not the same at all places. We know this because we have an instrument which measures pressure. This instrument is the barometer (you remember that the Greek word **baros** means weight, so a barometer is really a measure of heaviness). If a glass tube about 3 feet in length be closed at one end, filled with mercury, and inverted with its open end in a cup containing the same substance, the mercury will fall in the tube until its level is about 30 inches above the level of the mercury in the cup. This is because the weight of a column of mercury is equal to and balances the weight of the column of air 200 miles high. Now as the pressure of the air varies, so the height of the column of mercury varies. When we talk about a pressure of 30 inches or of 29·5 inches we mean that the pressure of the air will balance a column of mercury of that height. On a mountain 15,000 feet high—like Mont Blanc in Europe—the pressure is only about 15 inches. Now the air pressure at sea-level is affected by several factors.

(1) *Temperature.*—Heat causes air to expand and become less dense, and so when the temperature is high the pressure is low.

(2) *Water vapour.*—Air with much water vapour is lighter than air alone. So in India the pressure is less in the rainy season when the air is damp.

**Pressure Belts.**—When we look at the world as a whole we find there are certain marked 'high-pressure belts' and certain marked 'low-pressure belts', arranged as follows:

(1) Low-pressure belt round the equator (Doldrums).

(2) High-pressure belts just outside the tropics in both north and south hemispheres.

(3) Low-pressure regions over the cold regions round the latitudes of the Arctic and Antarctic Circles.

(1) *The Equatorial Low-pressure belt* is caused by the great heat making the air hot and therefore light, by the large quantity of water vapour: the air is always damp in this belt.

(2) *The Polar Low-pressure areas* are caused largely by the rotation of the earth. The envelope of air is thin here for the rotation swings the bulk of the air towards th

equator. At the poles themselves there are high-pressure centres, probably caused by extreme cold.

(3) *The High-pressure belts.*—It is reasonable to expect a belt of high-pressure near the tropics, between the two belts of low-pressure; and this is what we do find.

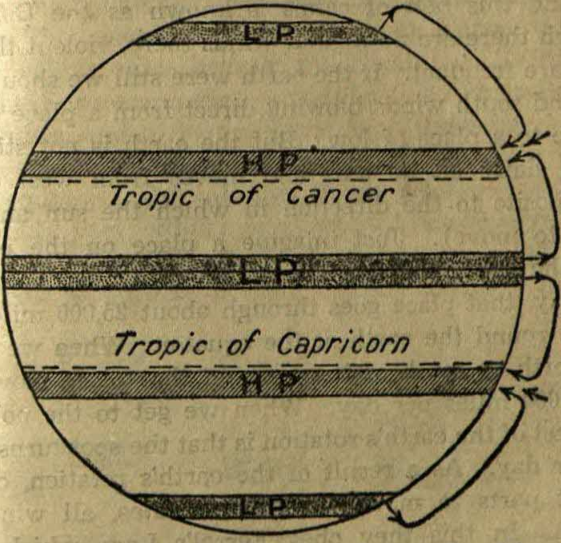


FIG. 49.—Diagram showing the pressure belts of the globe and the currents of air in the upper atmosphere.

Notice the movement of the air in the upper part of the atmosphere. The heated air of the equator rises, and flows away polewards. It becomes cooled and commences to sink towards the earth along the high-pressure belts.

## MOVEMENTS OF THE ATMOSPHERE—WINDS

Wind is the air in motion. The principal cause of winds is difference in pressure. Air always moves from a region of high pressure to a region of low pressure. You have already learnt the main belts of high pressure and low pressure on the earth, and the regular winds result directly from these pressure belts.

Both the high-pressure belts are regions of no wind and so are called the Calms of Cancer and the Calms of Capricorn. The low-pressure belt round the equator is also a region of calm, and this belt of calms is known as the Doldrums. Although there are no regular winds there, violent thunderstorms are frequent. If the earth were still we should have north and south winds blowing direct from a place of high pressure to a place of low. But the earth is not still, it is rotating daily on its axis and moves from west to east (*i.e.* opposite to the direction in which the sun and stars appear to move). Just imagine a place on the equator. When the earth revolves once upon its axis, as it does every day, that place goes through about 25,000 miles—the distance round the earth at the equator. When we take a place north or south of the equator, that place moves *less* than 25,000 miles per day. When we get to the poles the only effect of the earth's rotation is that the spot turns round once per day. As a result of the earth's rotation, causing different parts to move at different rates, all winds are deflected. In this they obey Ferrel's Law, which states simply that winds are deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. Taking, for example, a wind blowing from north to south in the Northern Hemisphere, if one stands with one's back to the wind, it will be seen to be deflected to the right, and thus to become a north-east wind—as with the North-East Trades. Another law of world-wide application is Buys-Ballot's Law. This law states that if in the Northern Hemisphere you stand with your back to the wind, you will have lower pressure to your left than to your right. In the Southern Hemisphere, the reverse will hold. Notice that the winds are named after the direction *from* which they come.

**Trade Winds.**—Now let us study the regular wind systems of the globe. Within the tropics, that is, in the Torrid Zone, we have winds blowing from the high-pressure belts towards the equator. These are the very important Trade Winds. They were given this name by Europeans in the days of sailing ships because the North-East Trade Winds blew the European vessels across to the rich lands of the West Indies, and so helped trade with those lands. North of the equator we have the North-East Trade Winds, south of the equator the South-East Trade Winds. These winds are usually very regular and constant, especially over the sea, but the position of the high-pressure belts changes somewhat according to the season. During our rainy season, that is in June, the sun is shining vertically over the Tropic of Cancer—that is, *north* of the equator—the high-pressure belt with the Calms of Cancer is found well to the

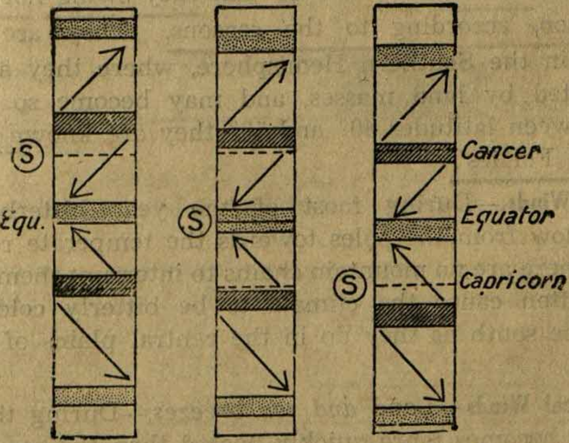


FIG. 50.—Diagram showing the swing of the wind systems. S = the sun; the first column shows the position of the sun vertically over Cancer in June; the third column vertically over Capricorn in December.

north, and lands as far north as 45° come within the influence of this belt. At the same time of year the Calms of Capricorn are in their northernmost position. In the month of June, the whole wind system of the world swings northward with the sun. In December, on the other hand, when the sun is shining vertically over the Tropic of Capricorn, the whole wind system swings southward. Study this very carefully in the Fig. 50.

**Anti-Trade Winds.**—These winds blow outside the Tropics, in the Temperate Zone. In the Northern Hemisphere they blow mainly from the south-west (South-West Anti-Trades), in the Southern Hemisphere mainly from the north-west (North-West Anti-Trades). They are not so constant in strength or direction as the Trade Winds, and are often called just 'Westerlies'. Notice that they swing north and south, too, according to the seasons. They are more regular in the Southern Hemisphere, where they are not interrupted by land masses, and may become so strong that between latitudes 40° and 50° they are known as the 'Roaring Forties'.

**Polar Winds.**—During most of the year bitterly cold winds blow from the poles towards the temperate regions. Where there are no mountain chains to interrupt them, these winds often cause the climate to be bitterly cold even far to the south as they do in the central plains of North America.

**Periodical Winds.**—*Land and sea breezes.*—During the day the land becomes more quickly heated than the sea. Consequently the air over the land becomes more heated too. It expands and becomes lighter, so that it is pushed upwards by cooler and heavier air flowing in from the sea. This causes a sea breeze. Many places in India on the sea-coast would be very hot were it not for this cooling breeze from the sea. During the night the land cools more rapidly than the sea, and some hours after sunset the air over the land is colder than the air over the sea, with the result that the cool, heavy air from the land flows out to sea as a land breeze.

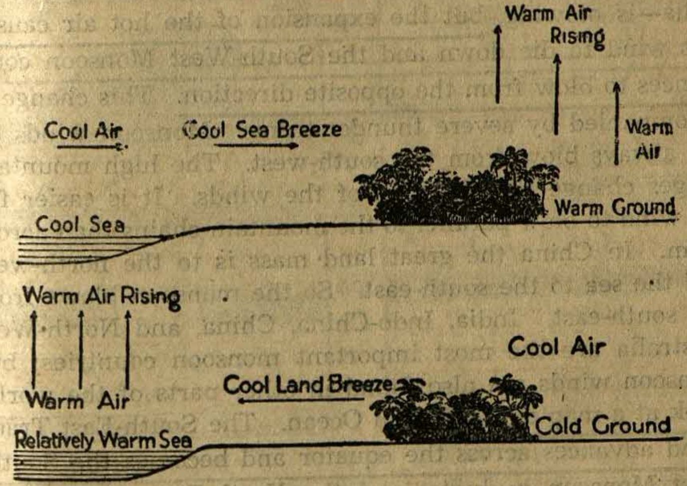


FIG. 51.—Diagram showing the cause of a cool sea breeze by day (upper diagram) and a land breeze by night (lower diagram).

*Monsoons.*—In the last paragraph you learnt how the land in getting very hot during the day, caused the air above it to get hot and expand. The cool air from the sea which takes its place causes a sea breeze. On a very much larger scale, you can imagine the air over a great mass of land becoming very hot during the hot weather, so that it expands and a great cool wind flows in from the sea and takes its place. This wind is a monsoon wind. 'Monsoon' comes from an Arabic word *mausim,* meaning season; and in India we often talk about the monsoon as the same as the rainy season. In geography books Monsoon usually means the *wind* which blows at this time. In India in the hot season the sun is shining vertically over the Tropic of Cancer—that is, roughly over the great plains of the Indus, Ganges, and Brahmaputra—until about May the air has become very hot. Normally at this time, the North-East Trade Wind—or the North-East Monsoon as we often call it in India—is blowing, but the expansion of the hot air causes this wind to die down and the South-West Monsoon commences to blow from the opposite direction. This change is accompanied by severe thunderstorms. Monsoon winds do not always blow from the south-west. The high mountain ranges change the direction of the winds. It is easier for the wind to blow parallel to the mountain chains than across them. In China the great land mass is to the north-west and the sea to the south-east. So the monsoon blows from the south-east. India, Indo-China, China, and North-West Australia are the most important monsoon countries; but monsoon winds are also found in other parts of the world. Look at a map of the Indian Ocean. The South-East Trade Wind advances across the equator and becomes the South-West Monsoon in India; and the North-East Trade Wind (or North-East Monsoon of India) crosses the equator and becomes the North-West Monsoon of Australia.

**Local Winds.**—The presence of high mountains, hot deserts, etc., often causes special winds, which receive special names in different parts of the world and about which you will learn later. Some of them, like the Sirocco which blows from the Sahara Desert across to Italy, are very hot; others which blow down from the mountains are very cold.

**The Wind Systems of the World.**—The arrangement of the pressure belts and winds shown in Figs. 49 and 50 is that which would exist if the surface of the earth were all the same—*i.e.* completely covered by water or completely occupied by land. Owing to the different rates at which land and sea become heated or lose heat, the pressure belts and wind belts are actually irregular as is shown in the diagram given below:—

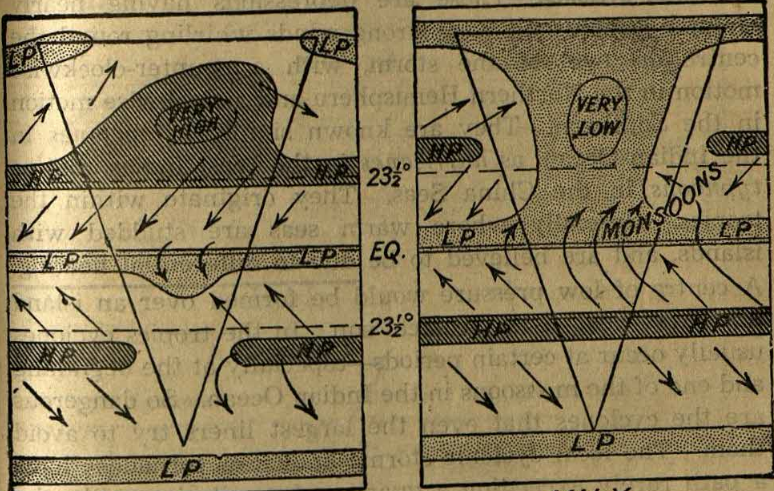


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FIG. 52.—Diagram showing the effect of land masses (represented by triangles) on the pressure belts of the world.

## CYCLONES (DEPRESSIONS) AND ANTI-CYCLONES

You have learnt that there are two main belts of high pressure round the world. In all parts of the world, however, but especially in the temperate regions, there are local areas of high pressure surrounded by regions of low pressure, or small regions of low pressure in a belt of high pressure. With regard to the wind belts of the world, especially in the belt of the Westerlies, there are little air swirls caused by differences in pressure which are called cyclones or depressions and anti-cyclones. A cyclone has a low pressure centre, an anti-cyclone a high pressure centre.

Cyclones of two types may be distinguished. There are the local cyclones or storms of tropical latitudes, and the cyclones or depressions and (anti-cyclones) which determine the daily weather of most countries in temperate latitudes.

**Tropical Cyclones.**—These are depressions having nearly circular isobars and very strong winds whirling round the centre or 'eye' of the storm, with a counter-clockwise motion in the Northern Hemisphere and a clockwise motion in the Southern. They are known simply as *cyclones* in the Indian Ocean, as *hurricanes* in the West Indies, and as *typhoons* in the China Seas. They originate within the tropics, especially where warm seas are studded with islands, and are believed to be due to differential heating. A centre of low pressure would be formed over an island under the heat of the tropical sun. In the tropics cyclones usually occur at certain periods—especially at the beginning and end of the monsoons in the Indian Ocean. So dangerous are the cyclones that even the largest liners try to avoid them. The local cyclonic storms known as tornadoes have a path rarely exceeding a quarter of a mile in width; the storm dies away after a destructive passage of twenty or thirty miles. Within this path almost everything is destroyed; buildings and trees are blown down, and heavy objects are sometimes carried to a considerable distance. *Tornadoes* are specially feared in parts of the south-eastern United States. When these violent storms occur at sea the funnel-shaped cloud which is formed by the whirling motion of the wind sometimes descends to the surface, draws up the water, and connects it with the cloud above, forming a column of water known as a *waterspout*. A similar action to this in the deserts of the world produces the dreaded *sandspouts*, associated especially with the Sahara. In the hot season, in the dry parts of India, violent dust storms occur and may sometimes be seen whirling along with a noise like that of an express train.

**Temperate Cyclones and Anti-cyclones.**—Fig. 53 shows the arrangement of isobars and winds in a cyclone and anti-cyclone in the Northern Hemisphere.

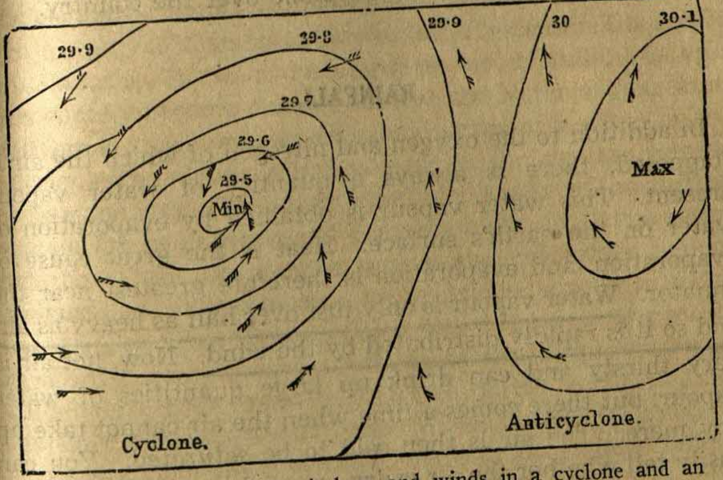

FIG. 53.—Diagram of the isobars and winds in a cyclone and an anti-cylone (Northern Hemisphere).

The word 'isobar' has already been used several times and means 'equal weight'. Isobars are imaginary lines drawn through places which have the same pressure at the same time. Just as *actual* temperatures have to be reduced to their sea-level equivalents before isotherms can be drawn, so *actual* pressure readings have to be reduced to sea-level equivalents before isobars can be drawn. Just as the whirls and eddies in a stream are caused by the current of water being retarded by friction along the banks, so the cyclones in temperate latitudes are due to the current of air in the westerly wind belts rubbing against the cold mass of air surrounding the poles. Cyclones with their in-blowing, anti-clockwise winds (reversed in the Southern Hemisphere) bring wet, stormy weather, cold in summer, but warm in winter; anti-cyclones are associated with fine weather, but often cold and foggy in winter. So the weather in countries like England changes from day to day according to whether there is a cyclone or an anti-cyclone over the country.

## RAINFALL

In addition to the oxygen and nitrogen of which the air is composed, there is always a quantity of water vapour present. This water vapour is obtained by evaporation of water on the earth's surface. Heat is the great cause of evaporation, and evaporation is therefore greatest near the equator. Water vapour is only just over half as heavy as air, and so it is rapidly distributed by the wind. Now, hot air is very thirsty and can drink up large quantities of water vapour, but there comes a time when the air cannot take up any more. The air is then said to be *saturated.* You can easily tell whether the air is dry or nearly saturated. Sometimes in the hot weather, when you feel very hot, you can watch the drops of perspiration on your arm. They do not stay there long; they quickly evaporate into the air and disappear. That is because the air is dry and thirsty. But on a hot day in the rainy season you will find the perspiration evaporates very slowly. That is because the air is damp and nearly saturated, and so cannot take up any more water vapour.

Just as we have a thermometer to measure the exact temperature of the air, so we can measure the exact 'dampness' of the air. The term we use for dampness is 'Relative Humidity'. When the air is quite saturated its relative humidity is said to be 100; when it is quite dry it is 0. In the rainy season the relative humidity is often as high as 80, in the hot season often as low as 50. Now hot air can hold much more water vapour than cold air, so that when warm damp air is cooled, the saturation point is soon reached and *condensation* takes place. Evaporation is the name we give to the change from liquid water to water vapour; the opposite change is called condensation. Your breath is warm and contains a large quantity of water vapour. On a cold day, breathe on to a looking-glass or a plate. It will immediately become cloudy, because the water vapour from your breath has condensed as little drops of water.

**Clouds.**—The clouds which you see in the sky are formed in the same way. The warm moist air rises from the surface of the earth, it expands and becomes cooler, with the result that the saturation point is passed and the water vapour condenses as little drops of water which appear to us as clouds. The little drops collect together as bigger drops which may fall as *rain*. Sometimes the drops evaporate again before they reach the surface of the earth, and we may have clouds without rain. When the upper layers of the air are cold, little pieces of ice may be formed instead of drops of water and fall to the ground as hailstones. We do not often see hail in India; when we do, the hailstones are often very big and so have not had time to melt before reaching the ground. In still colder regions the water vapour condenses as crystals of ice called *snow*. In India only those who are fortunate enough to go up into the mountains, where it is very cold, see snow, but in the colder parts of the world snow falls oftener than rain, and in the coldest regions rain never falls at all.

**Dew.**—At night the earth may become cooler than the air above it. This causes the vapour contained in the air to be condensed and deposited on the cooled surface. You have probably seen in the early morning the grass and ground quite wet. This deposit of water is called dew. In cold countries the surface of the earth at night may become colder than 32°F., and the deposit is frozen and is called *hoar-frost*. More dew is usually found on clear nights than on cloudy nights, for clouds prevent the surface of the earth from cooling so rapidly.

**Fog and Mist.**—When the water vapour is condensed but remains suspended in the air near the surface of the earth like a cloud, it is called a mist or fog. A mist is really exactly the same as a cloud, near the ground. In a fog the particles of water are smaller than in a mist.

**Essential Conditions.**—In order to have rain two important conditions must be satisfied. Firstly, we must have moisture-laden air; secondly, there must be some means whereby the air is cooled and condensation takes place. The air obtains its water vapour by evaporation from the surfaces of great areas of water, usually from the sea. This moisture-laden air may be cooled in two principal ways:

(*a*) by rising upwards into the colder upper regions of the atmosphere;

(*b*) by being blown as wind to colder regions.

This gives rise to various types of rainfall, thus:—

(1) **Convectional Rains.**—At the equator evaporation is very great, and as you have learnt, moist air is lighter than dry air and so it readily rises. It soon expands, cools, and rain falls. Rains which originate in this way are called *Convectional Rains*. This explains the heavy rainfall all the year round, which is found in the Equatorial Belt. Evaporation is greatest near the equatorial belt, and that is one reason why rainfall there is greater than in temperate regions.

(2) **Cyclonic Rains.**—Air is also forced to ascend in revolving storms such as tropical cyclones. If the air here is moisture-laden it will rise, be cooled and rain will fall. Rains in Britain are associated with depressions and so are called *cyclonic rains*.

(3) **Relief Rains.**—When a mountain range stands in the path of a current of moisture-laden air, the latter is forced to ascend in order to surmount the barrier. The ascent causes cooling due to fall of temperature by expansion, and contact with the cold mountain air. This cooling gives rise to what is known as *relief rainfall.*

The rainfall of a country or a place depends upon the following factors:

(1) The Direction of the Prevalent Winds. When warm winds blow towards a cooler region, the decrease in temperature causes condensation and rain falls. The Anti-Trade Winds blowing from warm to cooler regions bring rain, whilst in the case of the Trade Winds, which blow from cooler regions towards the equator, the rise in temperature prevents rainfall, and on the ocean little rain falls.

(2) The presence of land masses, especially mountains, tends to condense the water vapour. When the moisture-laden wind reaches mountainous land it is forced to rise. In rising it becomes cooled and rainfall results. Such rains are called Relief Rains. The South-West Monsoon, laden with moisture from the Indian Ocean, brings abundant rain to the Western Ghats and to the slopes of the Himalayas or the Khasi Hills. We have learnt that monsoon winds invariably blow from the sea on to the land, and so are nearly always rain-bearing winds. That is perhaps why many people when they speak of the monsoon mean the *rain* rather than the wind.

**Rain Shadow.**—When a moisture-laden wind is forced to rise and pass over a mountain range, it becomes cooled, and is sure to lose some of its moisture. The higher the mountains the more is the moisture that is lost. When the wind has finally passed over the range, it is almost a dry wind. Further, when the wind drops to the lower ground it is warmed rather than cooled, and so becomes a thirsty wind and not one which is ready to shed any of its moisture. That side of a mountain range which faces the rain-bearing wind and receives the rain we call *the windward side;* the dry side we call the lee side or *leeward side.* The land which is kept dry in this way by a mountain range is said to be in the *'Rain Shadow'* of the mountains. The rains which fall on the lee side are mainly convectional or cyclonic rains. A large part of the Deccan is in the rain shadow of the Western Ghats, the dry belt of Burma is in the rain shadow of the Arakan Yomas. On the rainy Arakan coast of Burma the rainfall is 200 inches, in the centre of the dry belt it is only 20. Central Asia, too, is in the rain shadow of the Himalaya Mountains, and so receives very little rain.

## SEASONAL DISTRIBUTION OF RAINFALL

(*a*) **Regions having rainfall throughout the year.**—Equatorial regions have rainfall throughout the year, chiefly due to convection. The rainfall is heaviest at and just after the equinoxes when the sun is vertical over the equator at mid-day.

Regions on the east side of continents in the trade-wind zone generally have rain throughout the year from the prevailing winds, e.g. South-east United States, South-east Africa and Australia.

Regions on the west side of continents in the zone of westerlies have rain throughout the year, due to prevailing westerlies, with most in autumn and winter when the ocean is warmer than the lands, and cyclonic activity is intense.

(*b*) **Regions having rainfall in Summer.**—

*Tropical.*—Between the trade wind deserts and the equatorial belt the rain follows the seasonal movement of the sun and falls mostly during the summer when the sun's mid-day altitude is high.

*Monsoonal.*—Here the rain is mostly is summer but is due to seasonal changes in wind direction, and also falls outside the tropics and on the east coast of continents.

*Interior of Continents in the Cool-Temperate Zone.*—Here the rain of the Prairie type falls chiefly in spring and early summer, due to convection.

(c) **Regions having rainfall only in Winter.**—This is known as the Mediterranean type of rainfall. For cause see p. 75.

**Dry Regions.**—The western sides of the continents in the zone of the Trade Winds are characterised by hot deserts because the winds which blow across them are dry, having blown over a land mass and towards warmer regions, e.g. the Sahara, Colorado, Atacama, Namib and Western Australia. Interior lowlands, far away from the sea or cut off by mountain ranges so that rain-bearing winds are inaccessible, are arid, e.g. Turkestan, the Takalamakan and the Gobi deserts.

**Rain-Gauge.**—Rainfall is measured by means of a rain-gauge. All the rain which falls over a certain area passes into a tunnel, and is collected in a jar where it cannot evaporate and where it can be measured. When we say that the rainfall for one day has been 2 inches, we mean that if all the rain which fell that day had remained where it fell, it would have formed a layer two inches deep. In nature as soon as the rain falls, some of it sinks into the ground, some of it evaporates, and some runs into the streams and rivers. That is why we use a rain-gauge to measure the total quantity which fell. Just as in recording temperature we took the readings every day, so we do with

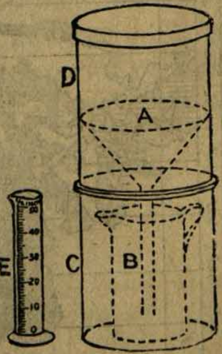

FIG. 54.—Picture of a rain-gauge.

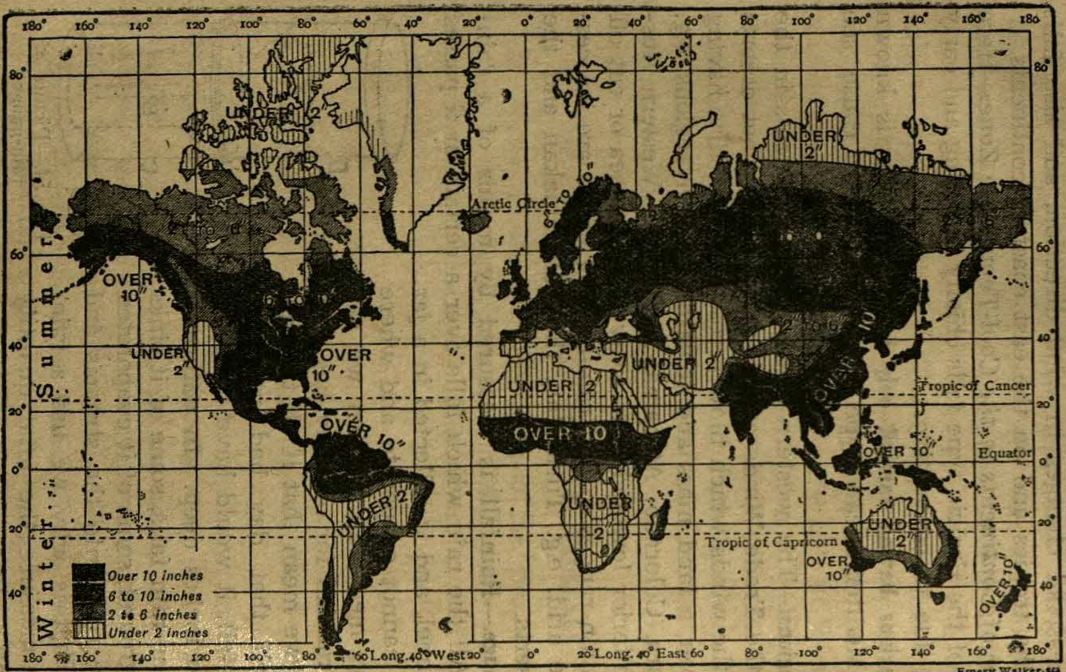

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FIG. 55.—Rainfall map of the world (Northern Summer).
(*From Longmans' "Geographical Series," Book III.*)

the rain-gauge. We note the amount which falls every day, and then by adding up the amounts for each day we get the monthly amounts. The most important figures are the *monthly averages.*

**Rainfall Maps.**—On a map of any country we can mark the monthly or yearly averages. Sometimes it is better to use the amount for a season, such as the rainy season. Fig. 55 is a map of the world, which shows you the rainfall for the months of June to August, when we have the rainy season in India.

On any rainfall map we can draw lines through places having the same rainfall; these lines are called 'isohyets'. You must remember that the rainfall changes gradually. You cannot have one region with a rainfall of more than 80 inches, and the next region less than 40. There must be an area between, even if it is only a narrow strip, having a rainfall from 40 to 80 inches. As remembering rainfall figures is not easy, it is enough to note:

(*a*) the time of year when most rain falls;

(*b*) whether the rainfall is heavy, moderate, low or poor.

In the tropics about 80 inches is heavy, 40 to 80 good, 15 to 40 moderate, and below 15 is poor. In temperate regions, where evaporation is less, about 40 inches is heavy, 15 to 40 good, 5 to 15 moderate, below 5 poor.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers with diagrams, sketches, etc.

1. Draw a diagram to show the main pressure belts of the world. Mark the latitudes between which they lie. Explain why they shift and show how this shifting affects certain parts of the world. (B. U. 1935)

2. Draw a diagram showing the wind systems of the world and explain how they are caused.

Why do they vary from one part of the year to another? (B. U. 1927)

3. Mention the forms in which moisture is found in the atmosphere.

4. How is rainfall measured, and how is a rainfall map constructed? Illustrate your answer by drawing and explaining a rainfall sketch-map of any actual country. (A.V.H.S., Bur., 1925)

5. What parts of the world have (*a*) heavy rainfall, (*b*) deficient rainfall? Give full reasons for your statement. (B. U. 1925)

6. Name the parts of the world which have rain (*a*) at all seasons; (*b*) in summer; (*c*) in winter; (*d*) no rain. State reasons in each case.

7. How are the South-West and the North-East Monsoons caused? Name the countries affected by them. Describe their effect on each of them. (B. U. 1928)

8. Give the circumstances on which the rainfall of a place depends.

9. Account for the following:—

(*a*) Bombay has an average rainfall of 75 inches, while Cairo has practically no rainfall.

(*b*) Madras has more rainy months but less rainfall than Bombay. (B. U. 1926)

(*c*) New Zealand is wet, while Central Asia is dry.

(*d*) (i) Summer rains in China;
(ii) Winter rains in Italy;
(iii) Rain at all seasons in the Amazon basin; and
(iv) no rain in Egypt.

10. Draw graphs from the figures (rainfall in inches) given below:—

| Month | Peshawar | Simla | Lahore | Allahabad | Calcutta | Karachi | Bombay | Madras |
|---|---|---|---|---|---|---|---|---|
| January .. | 1 | 3 | 1 | 1 | .. | 1 | .. | 1 |
| February .. | 1 | 3 | 1 | .. | 1 | ·5 | .. | ·5 |
| March .. | 1 | 3 | 1 | .. | ·5 | .. | .. | |
| April .. | 2 | 3 | ·5 | .. | 2 | .. | .. | 1 |
| May .. | 1 | 5 | 1 | .. | 6 | .. | ·5 | 2 |
| June .. | 1·5 | 8 | 2 | 4 | 12 | 3 | 21 | 2 |
| July .. | 6 | 19 | 7 | 12 | 13 | 2 | 25 | 4 |
| August .. | 4 | 18 | 5 | 11 | 14 | 2 | 15 | 4 |
| September .. | 1 | 6 | 2 | 6 | 10 | 2 | 11 | 5 |
| October .. | ·5 | 1 | .. | 2 | 5 | .. | 2 | 11 |
| November .. | ·5 | ·5 | .. | .. | ·4 | .. | ·5 | 14 |
| December .. | ·5 | ·5 | .. | .. | .. | .. | .. | 5 |
| Total .. | | | | | | | | |

Account for the total amount and the seasonal distribution of rain each case.

11. Draw a map of the world showing the seasonal distribution Rainfall by a suitable colour scheme.

## CHAPTER X

# OCEANS AND OCEAN-CURRENTS

**Waves.**—When the surface of the sea is disturbed, waves are produced. They are caused mainly by the wind striking on the surface of the water. It is only near the shores that the water actually moves forward. Although in great storms the height of the waves may be as much as 50 feet, their effect is only felt on the surface. At a depth of 200 or 300 fathoms it is probable that the water is undisturbed by the biggest storms.

**Currents.**—The movement of water from one part of the ocean to another gives rise to currents. The most important currents are the surface currents which are largely caused by the great wind systems of the globe. Careful observations on empty bottles thrown into the oceans enable us to determine the directions of the principal currents and to make map showing them. Currents also carry seed-pods, logs of wood, etc., from one country to another, and the coconut palm has spread to nearly all the small islands of the Pacific Ocean in this way. We also have bottom currents (or movements of water along the sea floor) as well as currents downwards (due to the sinking of cooled water) and currents upwards due to the uprise of warmer water. There are also local currents due to the tides or to differences in evaporation and salinity. The water in the equatorial regions becomes hot and tends to flow polewards as warm surface currents, while the colder water from the poles creeps along as bottom currents to take its place. The great evaporation in the hot regions causes bottom currents of cold water to flow in below and replace the loss. The currents do not flow north and south, but are deflected according to the rotation of the earth and the prevalent winds.

**Ocean Currents.**—There is the same general arrangement of currents in the Atlantic and Pacific and South Indian

Oceans. The northern part of the Indian Ocean is somewhat different, as it is enclosed by land and is affected by the S. W. Monsoon during the rainy season. In the cool and hot seasons the currents are generally similar in their arrangement to those in the North Atlantic or Pacific Oceans. The ocean currents are like the winds. They do not flow directly from north to south or from south to north, but are deflected according to Ferrel's Law by the rotation of the earth. Study Fig. 56 carefully. Notice in Fig. 50 the main wind systems, and in Fig. 56 how the general arrangement of the ocean currents agrees with that of the winds.

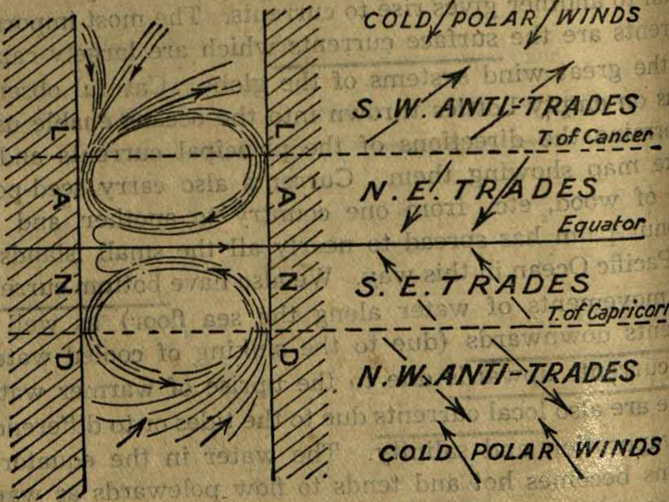


FIG. 56.—The general arrangements of currents and winds.

In the westerly wind belts we have currents from t west; in the belts of the Trade Winds they flow from t east. North and south of the equator are the two equator currents. Notice that they are both piling up water on t western side of the oceans, hence there is an equator counter-current between them, which brings part of water back. Notice which are the cold and which the warm currents. The swirl of the waters is in the same direction as the winds in an anti-cyclone. In the centre is an area of stagnant water often full of drifted seaweed (*Sargassum*) and often called the Sargasso Sea, though the true Sargasso Sea is the one in the North Atlantic. In Fig. 56 is shown the general arrangements of currents for all the oceans. Naturally their arrangement in each varies according to the shape of the land.

**Currents of the Atlantic Ocean.**—The cold waters from the Antarctic move under the influence of the westerly wind towards the east as the Antarctic or West Wind Drift; turn northwards along the shores of Africa as the cold Benguela current and then turn westwards under the influence of the S. E. Trade Winds as the South Equatorial Current. This current divides near Cape St. Roque into a southern branch—the Brazil Current—but the main stream flows north-westwards into the Gulf of Mexico. It emerges from the gulf as the famous Gulf Stream and is joined by the North Equatorial Current. At first the Gulf Stream is a rapid current of dark blue warm water. The average speed is three miles an hour or five miles in the coldest and warmest seasons. This is about equal to the speed of the Ganges or Irrawaddy. The current spreads out and becomes the North Atlantic Drift, flowing right across the Atlantic and keeping warm the shores of the British Isles and North-Western Europe generally. Part of the North Atlantic Drift turns Southwards as the Canaries Current, which joins the North Equatorial Current. Between the two equatorial currents is the Counter-Current. In the North Atlantic are two important cold currents: one, the Arctic Current, flows along the coast of Greenland; the other, more important, is the Labrador Current. The Labrador Current brings many ice-

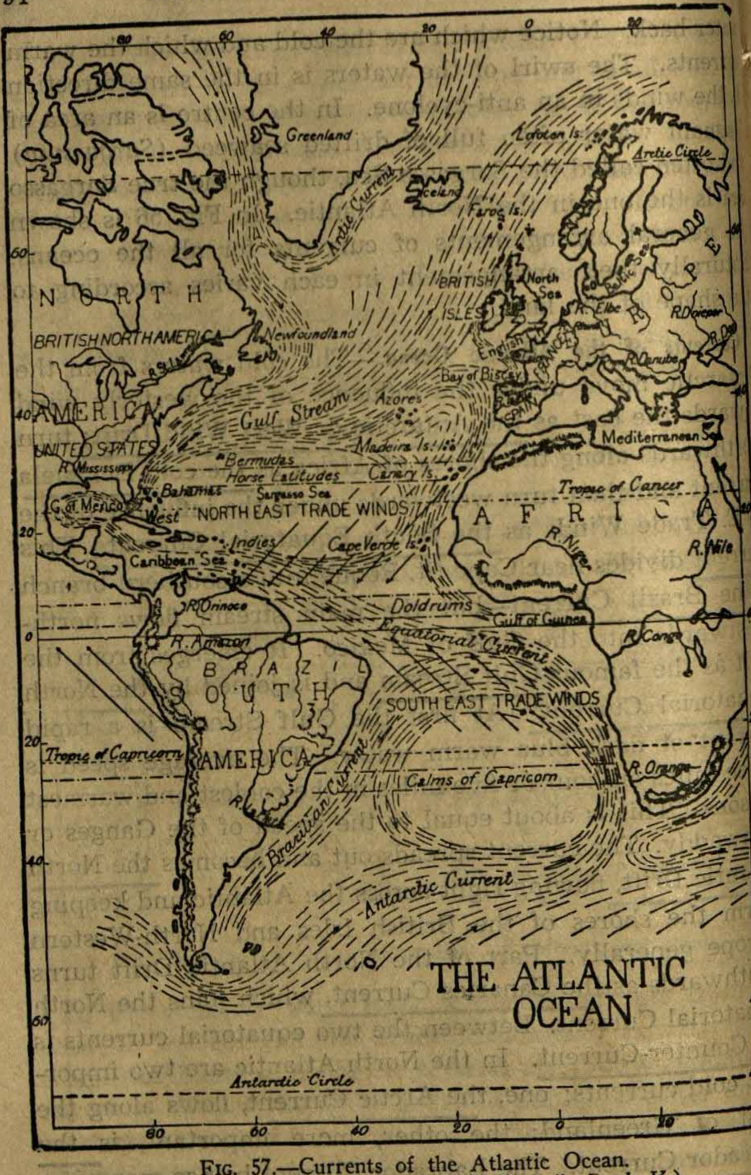


FIG. 57.—Currents of the Atlantic Ocean.
(*From Longmans' "Geographical Series", Book V.*)

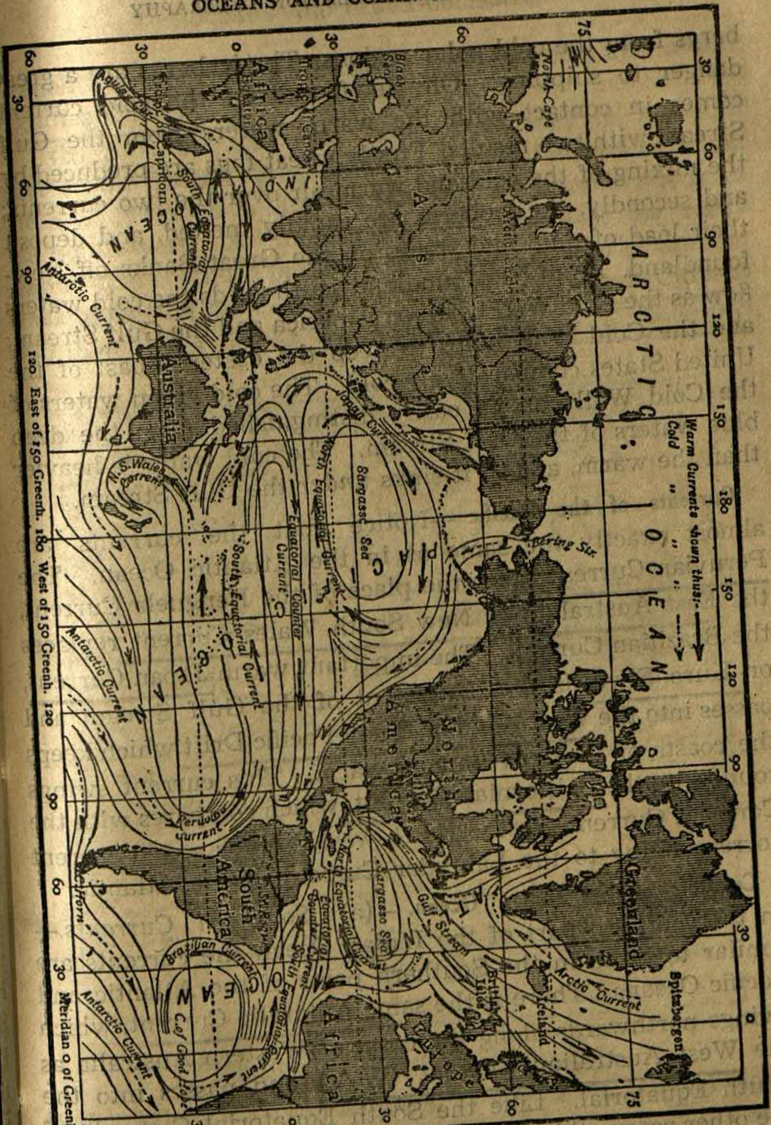


Fig. 58.—Currents of the Pacific Ocean.
(*From Longmans' "Geographical Series", Book V.*)

bergs from the cold polar regions. The icebergs are a great danger to shipping. Off Newfoundland the cold current comes in contact with the warm waters from the Gulf Stream with two results. Firstly, great fogs are produced by the mixing of the cold and warm air over the two currents; and secondly, the icebergs are rapidly melted, and deposit their load of mud and stones on the Great Banks off Newfoundland. From Newfoundland southwards the cold waters flow as the Cold Wall between America and the Gulf Stream, and the Cold Wall helps to keep the eastern coast of the United States comparatively cold. The cold green waters of the Cold Wall can be easily distinguished from the deep blue waters of the Gulf Stream. The cold water is heavier than the warm, and so it sinks *under* the Gulf Stream.

**Currents of the Pacific** —Notice that the currents are almost exactly the same as in the Atlantic Ocean. The Peruvian Current takes the place of the Benguela Current, the East Australian or New South Wales Current replaces the Brazilian Current. The important warm Japan Current, or Kuro Siwo, is the equivalent of the Gulf Stream and passes into the West Wind or North Pacific Drift which keeps the coasts of Western Canada warm. This current swings round into the Californian Current, which compares with th Canaries Current. In the North-west there is a cold curren corresponding to the Labrador Current of the Atlantic.

**Currents of the Indian Ocean.**—(a) *Southern Currents.*- In the southern part of the Indian Ocean the currents a similar to those in the Southern parts of the Atlantic ar Pacific Oceans. There is the same Antarctic Current, whi swings northwards along the coast of Western Australia the West Australian Current (W.A.) and passes into t South Equatorial. Like the South Equatorial Currents the other oceans this divides, but the southern branch is sp into two by the island of Madagascar. The most importa branch flows between the island and the mainland as the Agulhas Current (A.).

(b) *Northern Currents.*—The currents in the northern part of the Indian Ocean depend on the monsoon. When the S.W. Monsoon is blowing the drift of the water is from the south-west. At this time of the year—in our rainy season—the northern branch of the South Equatorial Current flows along the north-east of Africa as the Somali Current and then drifts across the ocean as the S. W. Monsoon Drift. When the N.E. Monsoon is blowing the water flows from the north-east and forms the N. E. Monsoon Drift, which is really the North Equatorial Current of the other

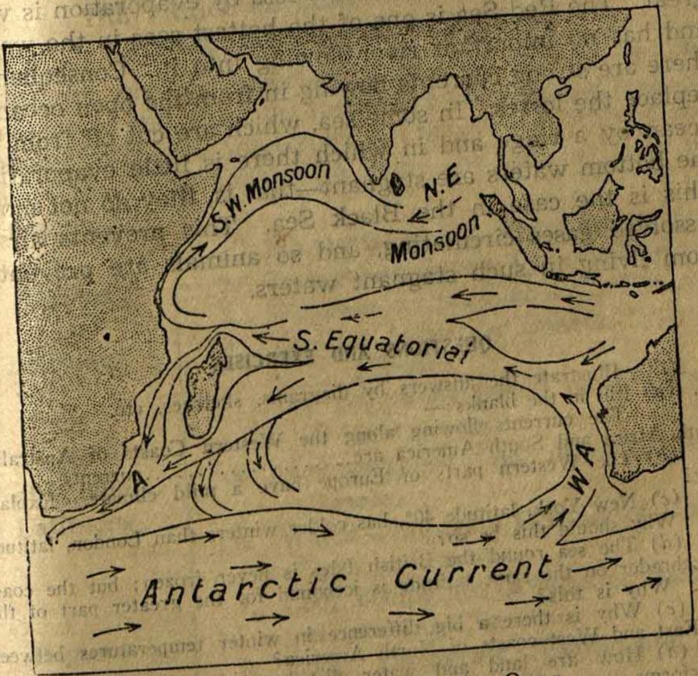


FIG. 59.—Currents of the Indian Ocean.

oceans. At this season a counter-current flows eastwards between the two equatorial currents.

**Currents of Inland Seas.**—In some seas, especially the Baltic and Black Seas, the amount of fresh water received from rivers is greater than the loss due to evaporation. Consequently there are outward-flowing currents of comparatively fresh water. Notice from your maps the straits through which these currents flow. Other seas, especially the Red Sea and Mediterranean Sea, receive only a little fresh water from rivers and the loss by evaporation is very great. The Red Sea is one of the hottest seas in the world, and has no important river flowing into it. Consequently there are strong currents flowing in from the open ocean to replace the losses. In some sea, which are cut off from the ocean by a ridge and in which there is little evaporation, the bottom waters are stagnant—that is, they do not move. This is the case in the Black Sea. This prevents air or dissolved gases circulating, and so animals are prevented from living in such stagnant waters.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches, etc.

1. (*a*) Fill in the blanks:—

The currents flowing along the Western Coasts of Australia, South Africa and South America are...................currents.

(*b*) The Western parts of Europe have a mild climate. Explain why?

(*c*) New York, latitude 40°, has colder winters than London, latitude 51°. Why should this be so?

(*d*) The sea round the British Isles is never frozen; but the coast of Labrador on the same latitude is icebound for the greater part of the year. Why is this?

(*e*) Why is there a big difference in winter temperatures between the East and West coasts of North America?

2. (*a*) How are land and water distributed? Name the principal waterforms.

(*b*) Which regions, owing to the influence of currents, suffer from fogs and why?

(*c*) Give a few examples of countries whose climate is more rainy than would be expected because of the Ocean Currents.

3. What do you know of the Labrador Current?

4. Draw a map of the Indian Ocean showing the direction and character of the ocean currents.

5. What is the Gulf Stream? How is it caused? Which countries are affected by it and in what way? (B. U. 1927.)

6. How are the ocean currents caused? (Why do they deflect?) Explain their influence on the climate of the lands along the coasts of which they pass. Trace the course of any one important current. (B. U. 1931 & 1935.)

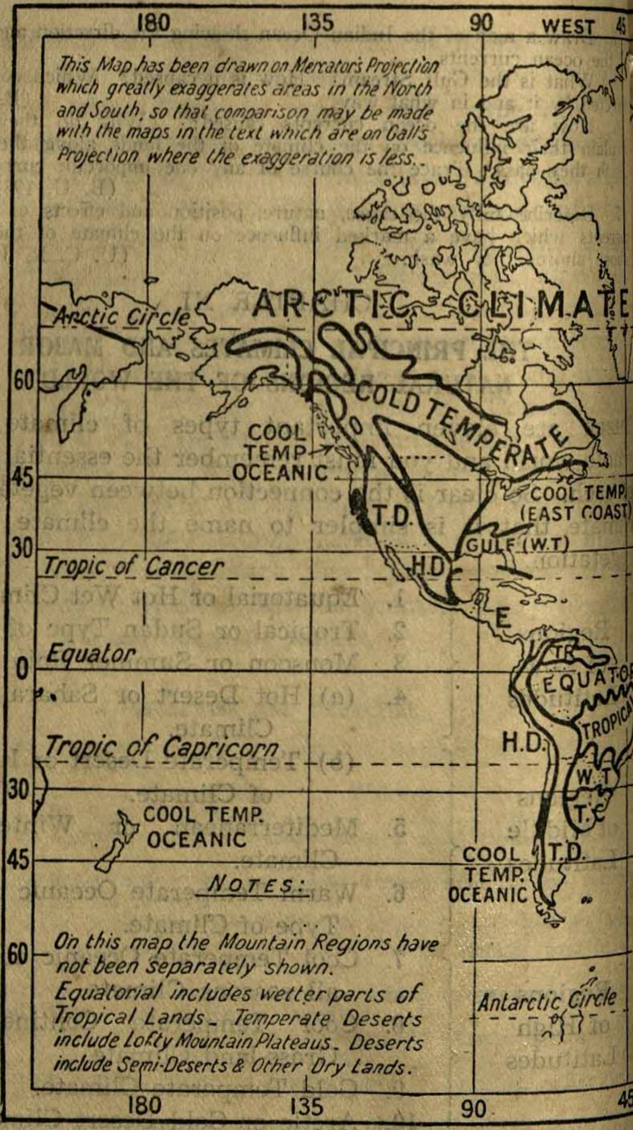
7. Describe fully the cause, nature, position and effects of two ocean currents which have a marked influence on the climate of the countries whose shores they wash. (U. C. R. J. I. 1926.)

## CHAPTER XI

# THE PRINCIPAL CLIMATES AND MAJOR NATURAL REGIONS OF THE WORLD

THERE are eleven important types of climate in the whole world and you must remember the essential features of each. So clear is the connection between vegetation and climate that it is simpler to name the climate after its vegetation.

| | |
|---|---|
| Regions of Low Latitudes | 1. Equatorial or Hot Wet Climate. |
| | 2. Tropical or Sudan Type of Climate. |
| | 3. Monsoon or Summer Rain Climate. |
| | 4. (*a*) Hot Desert or Sahara Type of Climate. |
| Regions of Middle Latitudes | (*b*) Temperate Desert or Iran Type of Climate. |
| | 5. Mediterranean or Winter Rain Climate. |
| | 6. Warm Temperate Oceanic or China Type of Climate. |
| Regions of High Latitudes | 7. Cool Temperate Oceanic or Rain at all seasons Climate. |
| | 8. Cool Temperate Continental or Grass-land Climate. |
| | 9. Cold Temperate Climate. |
| | 10. Arctic or Cold Desert Climate. |
| Elevation: | 11. Alpine Climate. |

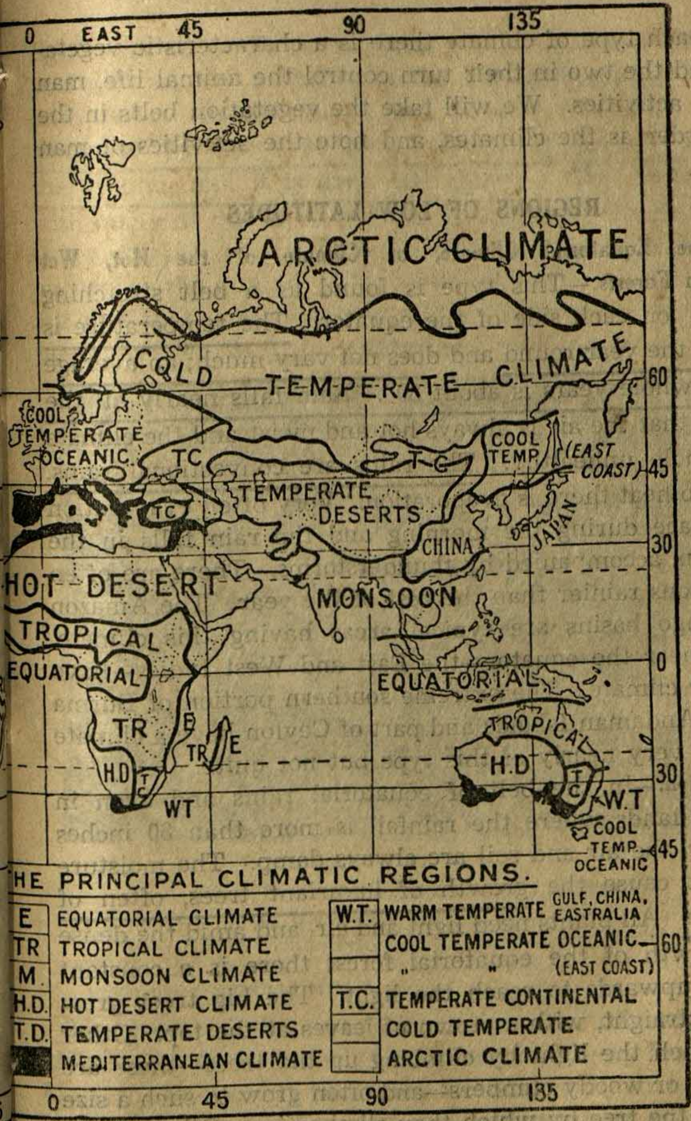


This Map has been drawn on Mercator's Projection which greatly exaggerates areas in the North and South, so that comparison may be made with the maps in the text which are on Gall's Projection where the exaggeration is less.

NOTES:

On this map the Mountain Regions have not been separately shown.
Equatorial includes wetter parts of Tropical Lands. Temperate Deserts include Lofty Mountain Plateaus. Deserts include Semi-Deserts & Other Dry Lands.

Fig. 60.—Th



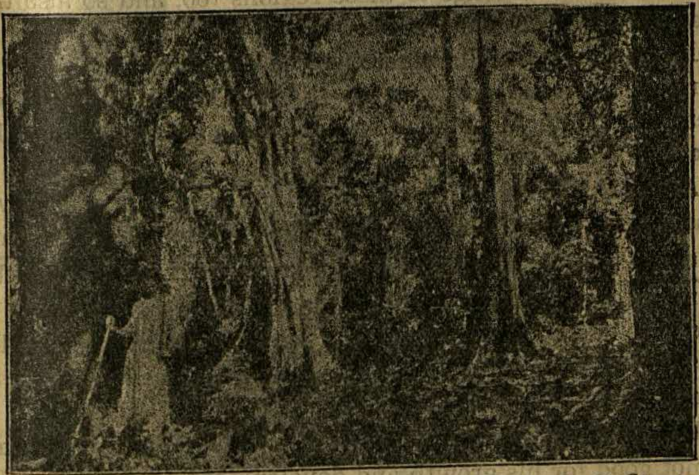
Climatic Regions.

For each type of climate there is a characteristic vegetation, and the two in their turn control the animal life, man and his activities. We will take the vegetation belts in the same order as the climates, and note the activities of man in each.

## REGIONS OF LOW LATITUDES

1. **The Equatorial Climate, or Climate of the Hot, Wet Evergreen Forests.**—This type is found as a belt stretching about 5° on each side of the equator. The temperature is high all the year round and does not vary much; an average for the whole years is about 80°. Rain falls nearly all the year, so that the air is always hot and moist and the climate as a whole unhealthy. The rains are convectional rains. Owing to heat there is evaporation. Very often evaporation takes place during the morning and the rain falls in the afternoon, accompanied by thunderstorms. There are often two seasons rainier than the rest of the year. The Amazon and Congo basins are typical areas having this climate. Islands near the equator—the East and West Indies—have a similar climate. The extreme southern portion of Burma and the Andaman Islands and part of Ceylon have a climate which is very nearly of this type but not quite.

**Vegetation.**—In the belt of equatorial rains and even in monsoon lands where the rainfall is more than 80 inches in a year, the air and soil are always damp. The moisture and heat cause the growth of luxuriant trees, often of great size. All plants need light and air, and amid the dense rank growth of the equatorial forest there is a constant struggle upwards to reach the light. The big trees grow tall and straight, with a crown of leaves at the top. Other plants reach the light by climbing up the trees—these are the lianas or woody climbers—and often grow to such a size as to kill the tree by which they climbed up. Other plants grow high up on the branches of the trees and reach the light that way. Even in places like Calcutta or Rangoon you will see the branches of the big trees thickly clothed with ferns. In the tallest and densest equatorial forests the mass of leaves is so thick that no sunlight ever reaches the ground, and it is dark and gloomy. This is the case with many of the forests of the Amazon and Congo Basins. Other forests are not quite so thick, and a little sunlight may reach the ground. The forests of Tenasserim in Burma are like that, and there we find a rich growth of smaller plants (which we call undergrowth) on the ground.



(*Photo: L. D. Stamp.*

FIG. 61.—Equatorial rain forest (Burma).

The big tree on the left is over 200 feet high. In the centre are many climbers with woody stems, abundant in equatorial forests. On the right is a tall tree. This forest is not as thick as many equatorial forests.

The trees of the equatorial forests are of very many different kinds, but nearly all of them have very hard wood. Much of the wood is very fine—like mahogany and ebony—but it is very difficult and expensive to cut down these great hardwooded trees. Even the evergreen forests of India—

which occur on the western coast of the Deccan, and in Arakan and Tenasserim in Burma—are scarcely touched yet.

**Human Activities.**—The equatorial forests are the home of the rubber trees, and rubber collecting is still an important industry in the Amazon forests of South America. But the most and best rubber is now obtained from plantations which man has made—in the equatorial belt in Ceylon, Malaya, East Indies, and Lower Burma. Another useful tree is the cinchona whose bark yields the medicine quinine. The cocoa tree belongs to these regions too, and so also the manioc. Near the sea, on sandy shores, we find the coconut palm everywhere. Its big seeds, the coconuts, float and are carried by ocean currents, so that the palm is found on nearly all tropical islands. In Africa the oil palm takes the place of the coconut palm.

Animals, like trees, must have light and air, and so we find most of the inhabitants of the equatorial forests are adapted for climbing. The monkeys are typical. In the denser forests nearly all the animal life is to be found in the treetops. There we find all sorts of animals specially adapted for climbing—tree-frogs and tree-lizards as well as birds, and a wealth of insect-life.

How is man to live in such forests? The damp moist air is not good for his growth and development, it is never cold, so that little clothing is required. Many of the trees of the forest yield fruits fit for food. But it is very difficult to cut down the forest and carry on agriculture, for the forest grows up again rapidly. So we find the equatorial forests are inhabited by backward uncivilised tribes; many of them, like the Pygmies of the Congo, are of very small size. They wear little clothing and often have no huts at all, or build small shelters in the trees. Some of them, like the natives of the Amazon Basin, are hunters and wanderers.

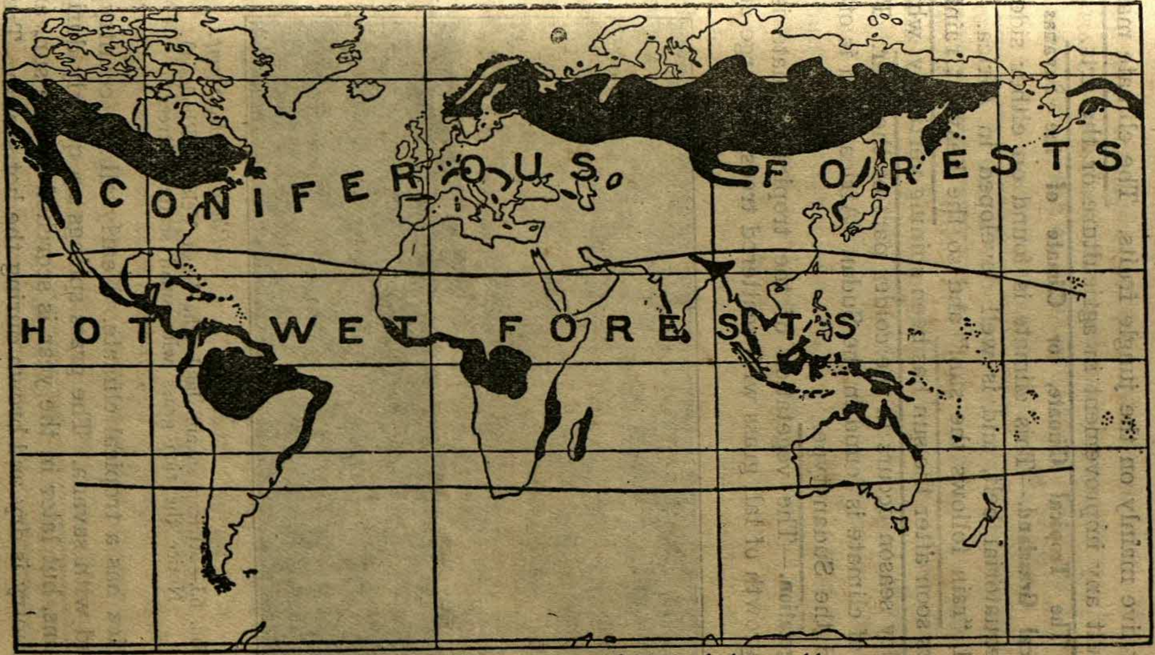
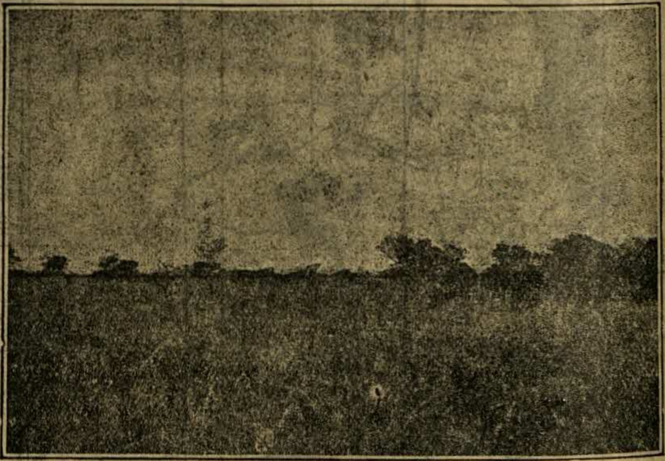


FIG. 62.—The evergreen forests of the world.

They live mainly on the jungle fruits. The climate makes difficult any improvement in agriculture or the arts.

2. **The Tropical Climate, or Climate of the Savanas or Tropical Grassland.**—This climate is found on either side of the equatorial belt, and is well developed in Africa. As usual, "rain follows the sun," and so the heaviest rainfall occurs soon after the sun has been shining vertically, whilst the dry season occurs in the colder part of the year. This type of climate is found in the Sudan (Africa), and is often called the Sudan type.

**Vegetation.**—The vegetation of the tropical climate is a rich growth of tall grass with scattered trees. A large area of Africa has a tropical climate. Nearly all the country is covered with savana. The grass springs up quickly during the rains, but later in the year is scorched by the sun, and the country is dry and brown during the hot season. Trees



(*Photo: L. D. Stamp.*

FIG. 63.—African savana land (the Bush Veld of Rhodesia). Notice the rich grass with small scattered trees.

become more numerous as the rainfall increases. Many of the tropical grasslands have strong winds, and much wind is bad for the growth of trees. We find many of the trees of the savana are umbrella-shaped, so that they expose only a narrow edge to the wind. In the savana climbing animals would have few trees to climb, and so we find the animals are specially adapted to escape from their enemies by swiftness of flight. There are two main groups of animals—the swift-footed grass-eating animals like the antelopes and giraffes, and the savage flesh-eating animals like the lion and tiger which live on them. Often the grass-eating animals will be disturbed in the midst of a meal and have to run away. So we find many of them swallow their food very quickly, and then when they are quiet and at rest are able to chew it over again—chew the cud, as we say. Cows and oxen do this.

**Human Activities.**—Just as the savanas (e.g. in Africa) have supported vast herds of wild grass-eating animals, so man is able to raise great herds of cattle on the tropical grasslands. So we find the inhabitants of the grasslands are at first hunters hunting the wild animals, later they become pastoral peoples interested in the keeping of herds of cattle. Read what is said of life on the Temperate Grasslands. It is very similar.

3. **The Monsoon Climate.**—The Monsoon Climate is very similar to the Tropical Climate, but the rainfall is caused in a different way. There is no need to describe to you a monsoon climate, because it is the climate we have in India. There is the cool season with little rain, lasting in India from November to about January; then the temperature begins to get higher, and we have then the hot season from March to May or June. The rains break in June and last till October. Nearly all rain falls in the latter period. If

these are the seasons in India, *in the Northern Hemisphere*, how would they be different in the Southern Hemisphere? Another name for the Monsoon Climate is the Summer Rains Climate, for the rain falls in the summer of the year. The summer would otherwise be very hot indeed, but the rains make it cooler. The Monsoon Climate occurs around the Indian Ocean, especially in India, Burma and North-Western Australia. There are small regions in North-Western South America which have a monsoon rainfall.

**Vegetation.**—The natural vegetation of the monsoon lands you all know from India. The ground is covered with forests which lose their leaves during the hot season. Trees require a great deal of water, which they drink in through their roots and lose by evaporation through their leaves. In the dry, hot weather it is necessary that the trees do not lose too much water. So in the monsoon forests the trees guard against this loss by shedding their leaves. When the rainfall is more than 40 inches the monsoon forests consist of fine large trees, of which teak and sal are familiar examples. But as the rainfall gets less and less the trees become smaller, and many of them are armed with thorns. The forest, as we say, passes into thorn forest and scrubland, and finally into desert with only a few scattered shrubs. Scrubland covers much of the Deccan, and passes into desert in the great Indian Desert. Here we have an example of how, with decreasing rainfall, rich forest passes gradually into desert. The monsoon forest is not so thick and dense as the equatorial forest, and large areas can easily be cleared for agriculture. Many plants of great value to man flourish in the monsoon climate. There are timber trees and bamboos, fruit trees like the mango, bread fruit and manioc as well as plantains and bananas. More important still are the cereals, rice in the wet lands and millet or sesamum in the drier parts. On certain soils cotton flourishes, and tea and coffee grow well on hill slopes. Maize can also be grown and wheat as a winter crop.

**Human Activities.**—The monsoon climate is, then, very favourable to the growth of food crops. So most of the monsoon lands are very thickly populated. In some parts it is easy to obtain sufficient food and the people become lazy, but if they do not allow themselves to become lazy there is great opportunity to be rich or learned, and so we find a high state of civilisation in many monsoon lands.

4. **The Climate of the Great Deserts.**—Passing from the region of the Tropical or Monsoon Climates towards the poles we find regions which are very hot and dry—so dry that scarcely any plants can grow. These regions lie mainly in the high-pressure belts just outside the tropics. The Trade Winds blow away from them towards the equator, the Anti-Trade Winds blow away from them towards the poles, and there are no winds which bring rain into the regions. Some of the regions are dry, too, because, like the centre of Asia, they are very far from the sea. There is little rain and no clouds, so that the sun's rays strike down fiercely on to the ground and make the days very hot indeed. The highest temperatures in the world are found in these regions. But at night the ground loses its heat very quickly, and so the nights are cool. We may divide these deserts into two groups:

(*a*) The Hot Deserts, occupying lowlands along the Tropics of Cancer and Capricorn. Examples are the Sahara Desert, the Desert of Arabia, and the great Indian Desert. In the Southern Hemisphere there are deserts in Australia, South Africa (Kalahari) and South America (Atacama).

(*b*) The Temperate Deserts, usually found on plateaux outside the tropics. They are much colder in the cold season, and may be covered with snow. Examples are the desert

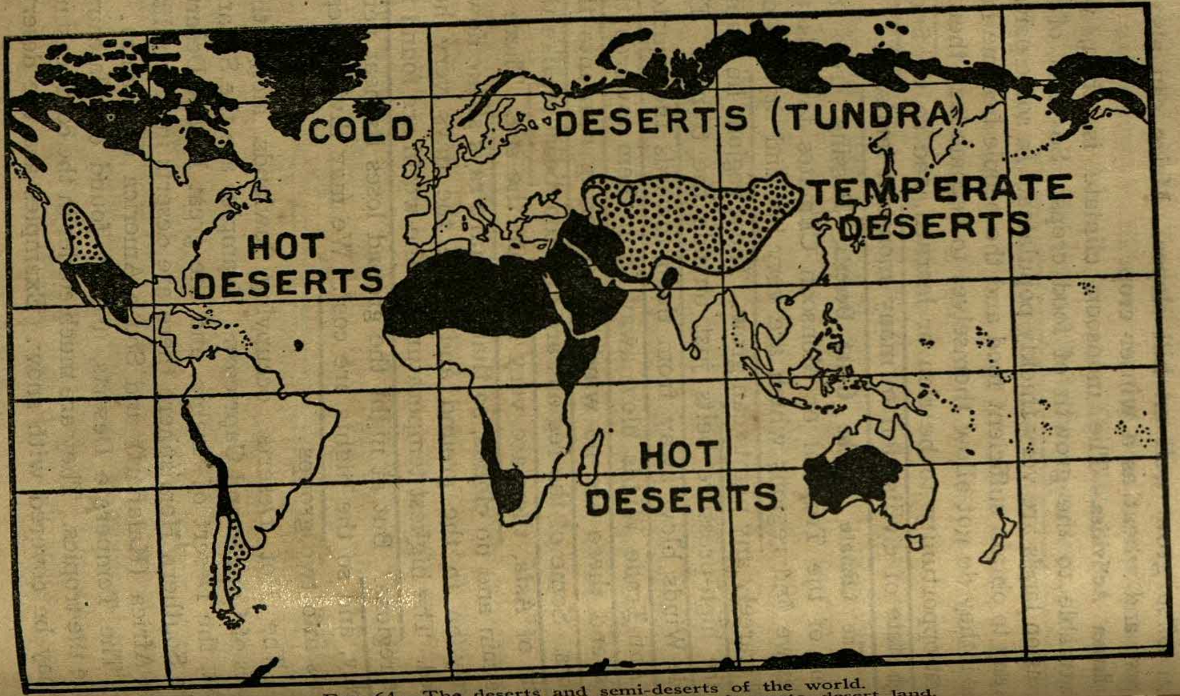


FIG. 64.—The deserts and semi-deserts of the world. Notice what a large part of the land surface is waste, desert land.

of Iran or Persia, the deserts of Gobi or Shamo, and Colorado in North America. [Note that these deserts lie in Regions of Mid-Latitudes on account of their distance from the Equator.]

**Vegetation.**—As the rainfall gets less the monsoon forest becomes poorer and poorer, passes first into scrubland and then into desert. In the same way grassland becomes poorer and poorer, and passes into desert. Thus desert is sometimes very, very poor grassland, at other times very, very poor scrub or woodland. There are a few deserts where absolutely *nothing* grows. We find desert plants have different means of storing water. Some of them have very long roots which go down to great depths and there reach water; many have fleshy stems and leaves in which they can store up water; in many the stems and leaves are covered with a thin coating of wax which prevents loss of moisture; still others are armed with sharp spines and thorns which protect them from being eaten by animals.

Then we must not forget the fertile spots, called oases, in the middle of the deserts. Some of these oases consist merely of a clump of palms surrounding a small spring of water, but others are many hundreds of square miles in area and very fertile. The most typical tree is the date-palm.

There are only a few animals of the desert, and they usually have a dull brown colour, which exactly matches the sand and prevents them from being seen. The most typical animal is the camel, which is able to go many days without water and which has a broad foot to prevent it from sinking into the sand.

**Human Activities.**—There are two classes of inhabitants in the desert—the wanderers who move with their camels from place to place, and the settled population of the oases who devote themselves to growing rice and rearing cattle, and especially to the cultivation of the date-palm. People living in the desert have little to see except the vast expanses of rocky and sandy waste. They must study the stars to guide them by night, and so we find that the desert has produced philosophical peoples—people who have plenty of time to think, and people learned in mathematics and the study of the stars. The wanderers live mainly in tents, but the dwellers in the oases build houses with thick stone walls—to keep them cool—and flat roofs, for there is no need to guard against rain. Those of you who live in the dry parts of North-West India know these flat roofs well.

## REGIONS OF MIDDLE LATITUDES

5. **Mediterranean Climate.**—As the sun moves north and south of the equator during the year, so the main wind belts of the world swing with it. There are parts of the earth between latitudes 30° and 45° which in summer are in the northern part of the Trade Wind Belt, and so are hot and dry like the deserts which join them on the side nearer the equator. In winter, however, these regions come under the belt of westerly winds, and so enjoy moist mild winters. In other words, this is the Winter Rain Climate. Contrast it with the Monsoon or Summer Rain Climate, but remember that the Monsoon Climate is on the whole a much hotter one. The Mediterranean Climate is so called because it is found all round the Mediterranean Sea, but it is also found on the western sides of the other continents—North and South America, Africa, and Australia.

**Vegetation.**—In the Mediterranean climate with its mild moist winter and hot dry summer, the plants grow mainly during the winter and have to protect themselves against loss of moisture during the hot dry summer. The vegetation of Mediterranean lands consists chiefly of small trees and shrubs, usually with small leathery leaves well adapted to withstand loss of moisture. Others, such as the olive, have leaves covered with silky hairs; others, like the vine, have very long roots. The Mediterranean trees are remarkable for their fine, luscious fruit. The most important plant is perhaps the vine, whose fruit (grapes) is made into wine as well as being dried. Then there are well-known fruits like oranges, lemons, peaches, apricots and pears; nuts, such as the almond, and many others. All of you know the tinned fruit which is sold all over India. Notice the labels on the tins. Most of it comes from California, some from Australia—from regions of Mediterranean climate. Some of the trees protect themselves from loss of moisture by having a very thick bark. This is of value as the source of cork. Wheat grows well in some Mediterranean lands. In damper or irrigated regions rice may be grown.

**Human Activities.**—The climate of Mediterranean lands is so favourable that it has harboured many of the great civilisations of the world—Greece and Rome. Food is easily obtained and the pleasant climate tends to make the people lazy and contented. Their houses usually have thick walls made of stone to keep them cool during the hot summer, whilst in the towns we find the people build shady 'piazzas' over the pavements.

6. **Warm Temperate Oceanic Climate.**—The Mediterranean Climate is found in regions on the western sides of the continents, but on the eastern sides, just outside the Tropics, there are sometimes regions having a warm moist summer and a cool, sometimes dry winter. This is very like the Monsoon Climate, but the temperate throughout the year

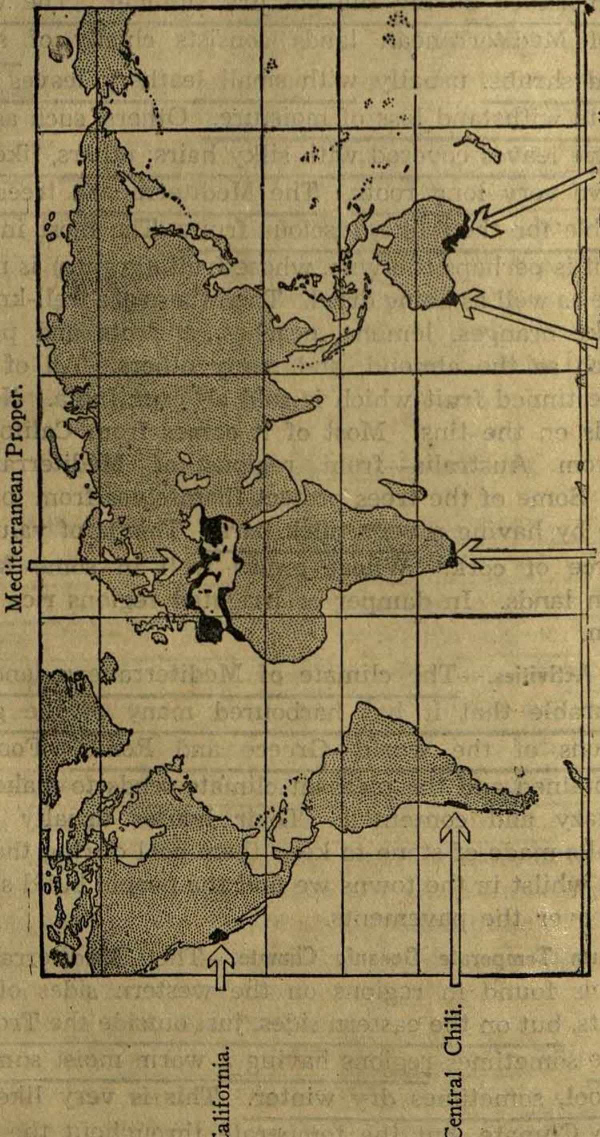
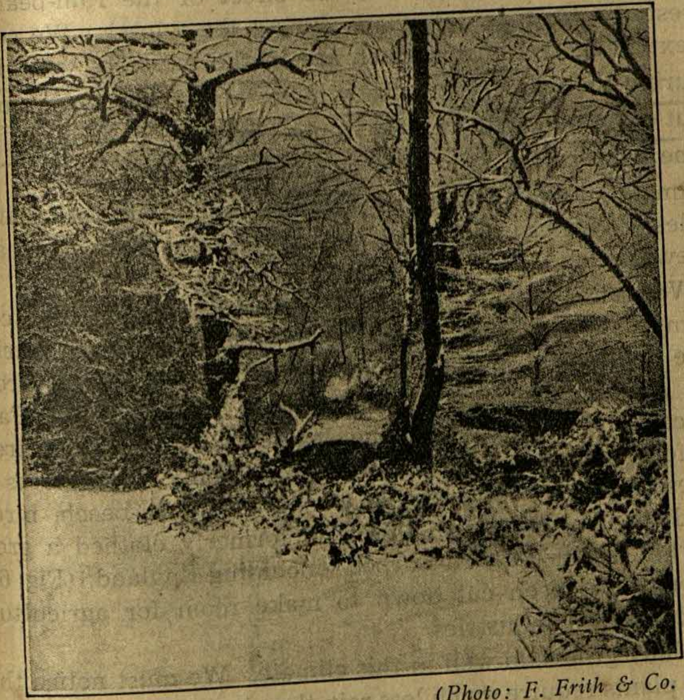


FIG. 65.—Map of the world, showing the Mediterranean regions.

is less as the regions lie outside the tropics. China and Eastern Australia are examples, and so this is sometimes called the China type of climate.



(*Photo: F. Frith & Co. Ltd.*

FIG. 66.—Deciduous forest in winter (England). Notice that the trees have lost all their leaves and snow covers the branches and the ground.

**Vegetation.**—The lands having a warm temperate climate are forested, and the forests are often very similar to those of monsoon lands but the trees are different. Both maize and rice grow well, and these lands are thickly peopled—as, for example, China and the South-Eastern part of the United States.

## REGIONS OF HIGH LATITUDES

7. **Cool Temperate Oceanic Climate.**—You learnt that the Mediterranean regions feel the effect of the rain-bearing westerly (Anti-trade) winds during the winter. We come next to those regions which are in the westerly wind belt during the whole year. They have rain all the year round, but compared with rain in tropical regions, it is much less. The winters are mild, and the summers cool. This is the climate of North-Western Europe (including the British Isles), Western Canada, Southern Chili, Tasmania, and New Zealand.

**Vegetation: Cool Temperate Deciduous Forests.**—In the cool temperate deciduous forests, trees shed their leaves during the winter to protect them against the cold and frost. In America the end of the summer is called the 'Fall', because it is then that the leaves 'fall' from the trees before the cold of winter comes on. Many of the trees of these forests yield valuable wood—oak, elm, beech, birch, and maple. Forests of this kind formerly clothed a great part of North-Western Eurpoe—including England, (Fig. 66) —but have been cut down to make room for agriculture and pastoral industries.

Many grains do well in this climate. We must notice that the plants require much less rain than in countries like India, because the sun is less powerful in summer and does not dry up the moisture to the same extent. South-Eastern England has a rainfall of about 25 inches (roughly the same as the centre of the dry belt in Burma or the driest parts of the Deccan in India), yet the country is clothed with green grass for the whole year. So we find wheat grows well in the drier parts, as in the east of England, where the rainfall is less than 30 inches. In damper regions the grass grows richly and affords fine pasture for cattle. Sheep are found

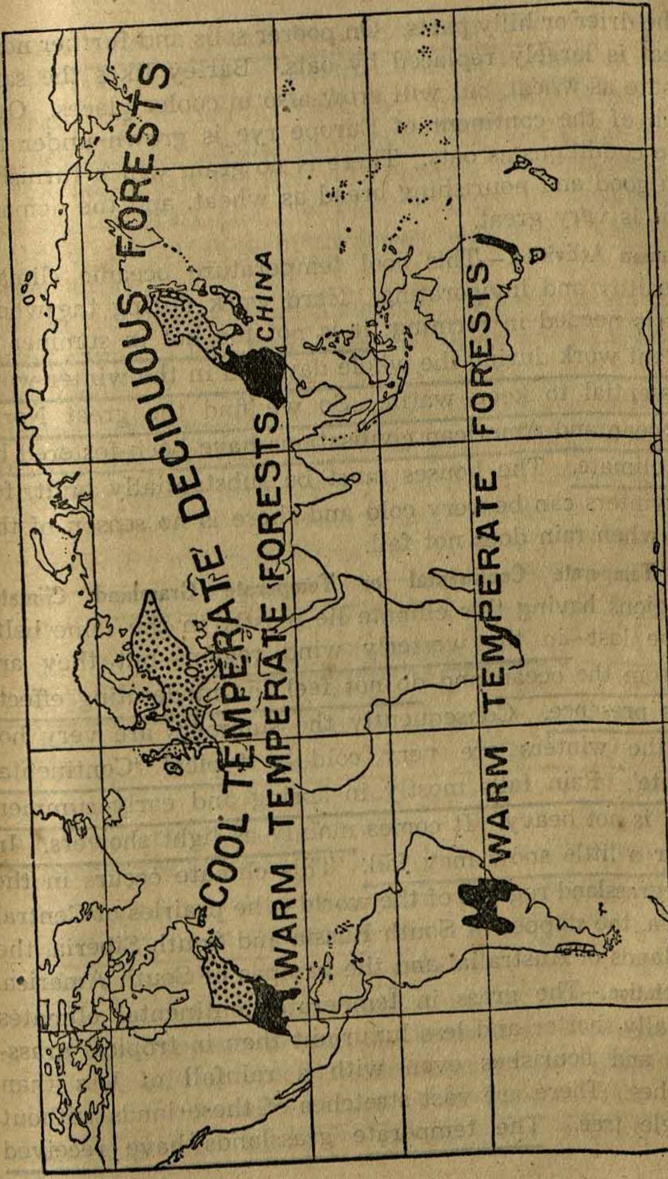


FIG. 67.—Temperate forest regions.

in the drier or hilly parts. On poorer soils and further north wheat is largely replaced by oats. Barley likes the same climate as wheat, but will grow also in cooler places. Over much of the continent of Europe rye is grown under the same conditions as oats. There is no grain which furnishes such good and nourishing bread as wheat, and the demand for it is very great.

**Human Activities.**—This cool temperature oceanic climate is healthy and invigorating. Hard work during the whole year is needed in farming; it is not too hot in summer to prevent work during the whole day, and in the winter work is essential to keep warm. So we find the great North European and American civilisations have been fostered by this climate. The houses must be substantially built, for the winters can be very cold and there is no season of the year when rain does not fall.

8. **Temperate Continental or Temperate Grassland Climate.** —Regions having this climate lie mostly in the same belts as the last—in the westerly wind region—but they are far from the ocean and do not feel the moderating effects of its presence. Consequently the summers are very hot and the winters are very cold—a typical 'Continental Climate'. Rain falls mostly in spring and early summer, but it is not heavy. It comes mainly as light showers. In winter a little snow may fall. This climate occurs in the great grassland regions of the world—the prairies of Central Canada, the steppes of South Russia and South Siberia, the downlands of Australia, and the pampas of South America.

**Vegetation.**—The grass in temperate continental climates is usually shorter and less luxuriant than in tropical grasslands, and flourishes even with a rainfall of less than 15 inches. There are vast stretches of these lands without a single tree. The temperate grasslands have received different names in different continents—Steppes in Asia and Europe, Prairies in North America, Pampas in South America, Veld in South Africa, and Downland in Australia—but they are very similar throughout. In spring the ground is fresh and green and rich with flowers, in summer the sun scorches the grass and the whole country becomes brown, whilst in winter it is often snow-covered and the rivers turned to ice.

As in the tropical grasslands, we find swift-footed grass-eating animals. The horse, ass, and sheep are all typical of these lands.

**Human Activities.**—The inhabitants of the grasslands are nomads. They wander about from place to place with their flocks, for when the grass dries up in one region a move has to be made to find fresh pasture elsewhere. In richer regions cattle are most important, in drier parts sheep and goats. The people are fine horsemen, for they have to spend much of their time riding, watching the vast flocks and herds. In past ages the grasslands have acted as great 'reservoirs' of people. After a series of bad seasons it may be necessary for a great body of people with their herds and flocks to move bodily in search of fresh lands. In this way great waves of people have swarmed out of the grasslands and settled in surrounding countries. In the centre of Arabia are grasslands from which the Arabs have come out and overrun the lands round about.

In recent times the richer areas of grassland have been rendered suitable for wheat cultivation, and farming had largely replaced the pastoral industries.

9. **Cold Temperate Climate, or Climate of the Coniferous Forests.**—The Cool Temperate Oceanic Climate passes gradually into a colder climate where much of the moisture falls as snow and not as rain. This is the region of the coniferous forests,

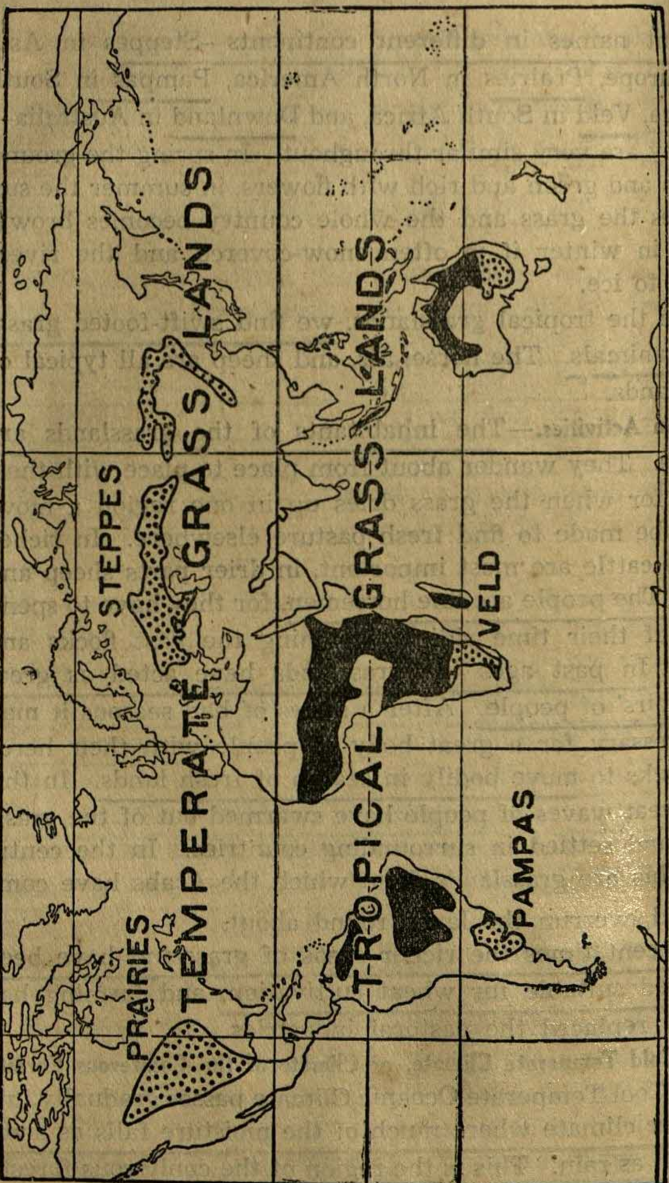
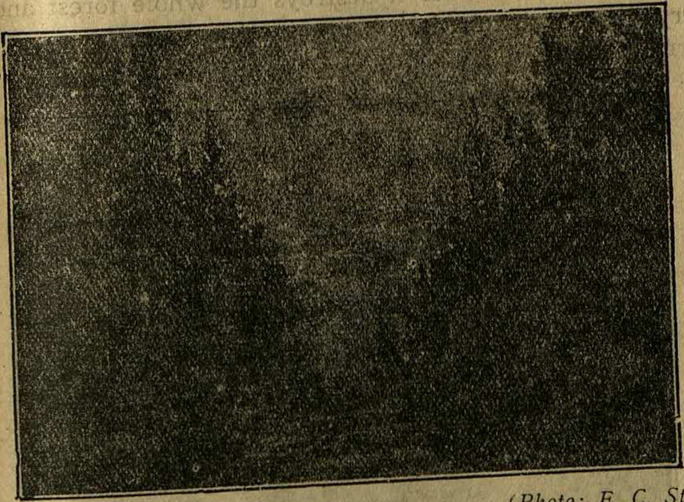


FIG. 68.—The grasslands of the world. The tropical gras slands of savanas are shown in solid black, the temperate grasslands by dots. The word savana may be spelt 'savana' or 'savannah'.

d occurs as a great belt across North America, Northern rope, and Northern Asia.

**Vegetation.**—Stretching as a great belt across the Northern emisphere is a vast tract of evergreen trees with needle-aped leaves—trees which yield valuable soft timber.

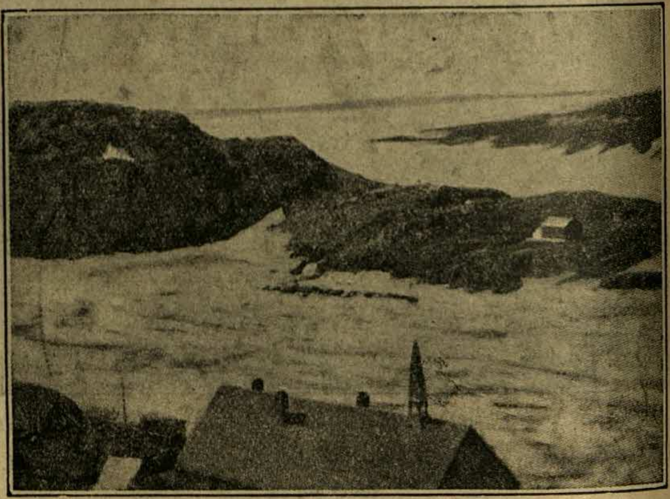


(*Photo: E. C. Stamp*

FIG. 69.—Coniferous forest amongst the Rocky mountains at Banff. Canada.

**Human Activities.**—The forests are inhabited by animals which have a thick fur to protect them from the bitter cold of winter, so many of the inhabitants are hunters. Naturally logging and timber-working industries are important. The trees are felled during the winter, dragged over the slippery snow and floated down the rivers when the snows melt.

Similar forests cover large areas of the higher regions of Central Europe—there are fine forests on the mountains of Germany and Switzerland and the Carpathians. Wood is abundant and so is the general material for dwellings, which range from the rough log-huts of the North America settlers to the fine wooded 'chalets' of Switzerland. In India we are accustomed to think of burning off the undergrowth in the teak forests every year—about February or March. In the coniferous forests fire is something very much to be feared, for it destroys the whole forest and is very difficult to check. A fire in these forests is a very terrible thing.



(*Photo: Moravian Missio*

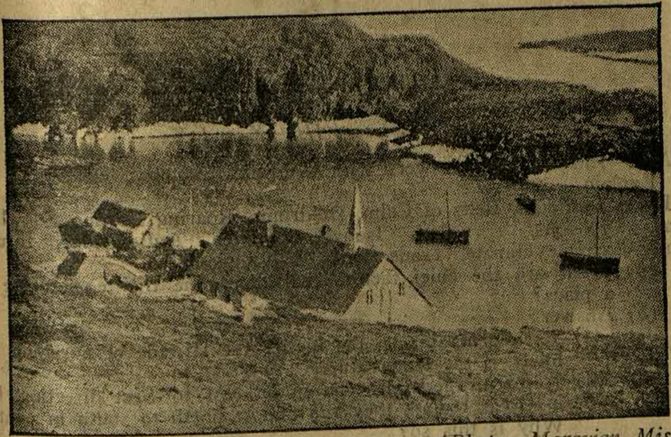
FIG. 70.—Killinek, Labrador, in the cold season.

Notice that the sea is frozen over. Notice the steamer in the far distan frozen into the ice. This photograph was taken in the cold season wh the snow had already melted from the lands.

10. **Arctic or Cold Desert Climate.**—Here the winters a long and very cold, and there is only a short sharp summe This climate occurs in the frigid zones—inside the Arc and Antarctic circles.

**Vegetation.**—In Arctic and Antarctic regions are va stretches of desert land—desert not because of the heat in the hot deserts, but because of the extreme cold. It is too cold for the growth of trees, and practically the only vegetation is moss and lichens.

**Human Activities.**—The reindeer is almost the only animal, and furnishes meat, milk, and clothes for the few poor inhabitants of these dreary 'barren lands'. Agriculture is impossible, for the ground is frozen for threequarters of the year. In some parts of the tundras the short sharp summer produces a wealth of flowers, but for the remainder of the year the ground is snow-covered.



*(Photo: Moravian Missions*

FIG. 71.—Killinek, Labrador, in the warm season. Notice the bare ground of the Tundra region.

11. **Alpine Climate.**—The effect of climbing up a mountain is like going a great distance towards the poles. As we ascend, the climate gets colder and colder. Near the tops of high mountains it is very cold, and there is perpetual snow above the 'snow-line'. Just below the snow-line the climate is not quite the same as in Arctic and Antarctic

lands. So we have a special name for the climate found on high mountains—the 'Alpine' Climate, named after the great mountain chain, the Alps of Europe.

**Vegetation.**—As we ascend the sides of a mountain we often pass through the same vegetation zones as if we went on a long journey towards the poles. Thus on the Himalayas we find coniferous forests like those of Northern Europe. The grasslands which are often found clothing mountain sides are important, because they afford pasture for sheep and cattle. These 'Alpine pastures' are especially importan in Switzerland.

### QUESTIONS AND EXERCISES

*Revise Chapters VIII, IX and X*

*N.B.*—Illustrate the answers with diagrams, sketches, etc.

1. Explain :—
Horse Latitudes, Belts of Calm, Doldrums, Roaring Forties, Snowlin Isobar, Typhoons, Tornedoes, Isohyet, Cyclone, Anti-cyclone, Insul climate, Extreme climate, Trade winds, Westerlies.

2. (*a*) What are the chief factors that determine the temperature a place?
   (*b*) Answer:
      (i) As a general rule, the higher the latitude of a region th lower is the temperature.
      (ii) Isotherms generally run in an east to west direction, b in Great Britain they run almost north to south in winte Why is this so?
      (iii) Quito, though on the equator, has a temperate climat Why? (B. U. 193

3. What are the causes that influence climate? Explain how th work by referring to the climate of any one place in the Bomba Presidency.

4. The average temperatures for the months, June and January f Bombay, Simla and Lahore are given below:—

| Town | Mean Temperature June | Mean Temperature January |
|---|---|---|
| A | 93°F. | 54°F. |
| B | 82°F. | 72°F. |
| C | 67°F. | 39°F. |

State which of these three towns the letters A, B and C represe Give reasons for your answer. (B. U. 192

5. The average temperatures of Karachi, Darjeeling and Colombo for the months of June and December are given below:—

| Town | Mean Temperature June | Mean Temperature December |
|---|---|---|
| A | 80°F. | 79°F. |
| B | 87°F. | 67°F. |
| C | 60°F. | 42°F. |

State which of these three towns the letters A, B and C represent. Give reasons for your answer.

6. (*a*) The following are the mean temperatures for January and July of Delhi, Simla, Cape Town, Darwin and Bombay. Which letters represent these places? Give reasons for your answers:—

| Town | Mean Temperature January | Mean Temperature July |
|---|---|---|
| A | 39°F. | 65°F. |
| B | 70°F. | 55°F. |
| C | 75°F. | 80°F. |
| D | 58°F. | 87°F. |
| E | 84°F. | 77°F. |

(B. U. 1935)

(*b*) The heights above sea level and the mean annual rainfall figure of Poona, Mount Abu, Allahabad, Karachi and Bombay are given below:—

| Town | Height in feet | Mean Annual Rainfall in inches |
|---|---|---|
| A | 37 | 73 |
| B | 309 | 39 |
| C | 1,840 | 28 |
| D | 3,945 | 62 |
| E | 49 | 7 |

State which of these towns the letters A, B, C, D, E stand for. Give reasons for your answer. (B. U. 1928)

7. Read the Climographs carefully. How can you distinguish an Equatorial Climate from the Climate of grasslands of Mid-Latitudes?

8. Explain the difference between the climates of Cape Town and Tripoli as shown by the following:—

| | Cape Town | Tripoli |
|---|---|---|
| Latitude .. .. | 33°S. | 33°N. |
| Altitude .. .. | 37 ft. | 97 ft. |
| Temperature in January .. | 70°F. | 58°F. |
| Temperature in July .. | 55°F. | 79°F. |
| Annual rainfall .. .. | 25 in. | 14 in. |

Season of heaviest rainfall June to August, December to February. (B. U. 1919)

9. The figures given below show the average temperature and rainfall of a certain place. Examine the figures and answer the following questions:—

(*a*) In which hemisphere do you consider the place to be and why do you think so?

(*b*) Describe briefly the summer climate and the winter climate of the place.

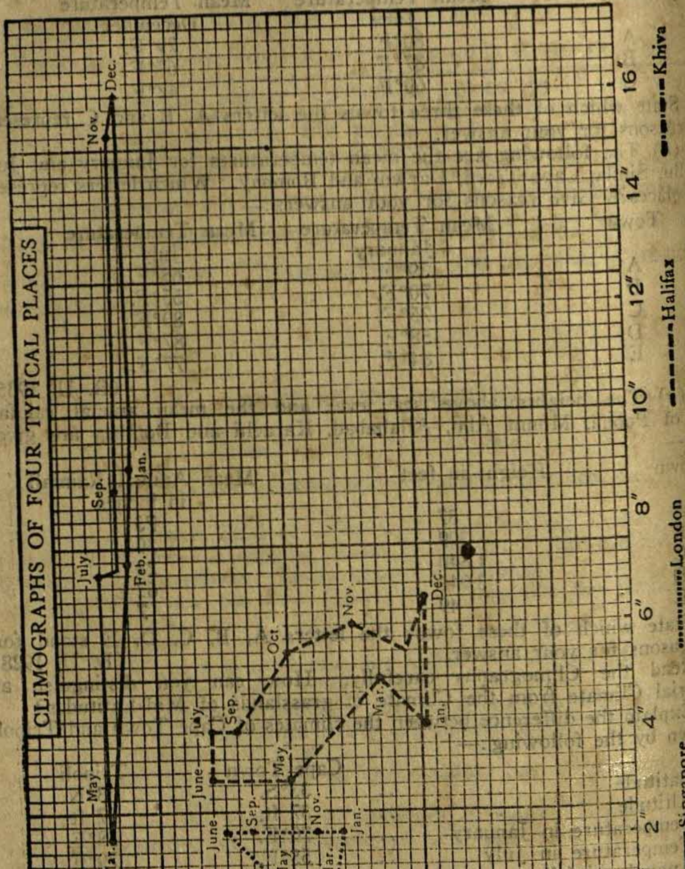


FIG. 72.—Climograph of 4 Typical Towns.

(*c*) Name any parts of the world which have this type of climate.

| | Jan. | Feb. | March | April | May | June |
|---|---|---|---|---|---|---|
| Temperature .. | 73 | 74 | 71 | 66 | 60 | 56 |
| Rainfall .. | 0 | 0 | 1 | 2 | 5 | 7 |
| | July | Aug. | Sept. | Oct. | Nov. | Dec. |
| Temperature .. | 55 | 56 | 58 | 61 | 65 | 71 |
| Rainfall .. | 6 | 6 | 3 | 2 | 1 | 1 |

10. Write a brief account of the climate of either the Temperate Grasslands or the Equatorial Forests and indicate where the climate you describe is found. (A.V. H.S., Bur. 1925)

11. What is meant by the Mediterranean Climate and where is it found? Compare it with monsoon type of climate. Account for the difference.

12. Explain: Steppes, Prairies, Pampas, Savannas, Veldts. Where can each of these be found?

13. Why are some areas forests and others treeless? Mention the two main types of forest belts in the world.

14. Describe the distribution of the great coniferous forests of the world and the climates of the regions in which they grow. What are the chief economic products of these? (B. U. 1925)

15. Mention the principal desert areas in the world, and explain why they are and where they are. (B. U. 1929)

Of what use to mankind are deserts? Show how they have formed boundaries between nations.

16. Compare and contrast the equatorial and coniferous forests, dealing especially with the climatic conditions which have given rise to each.

17. How do the climate and natural vegetation of the Equatorial forest region differ from those of the Mediterranean region? Which of the two regions is more developed and why? (B. U. 1935)

18. (*a*) What is a natural region? (*b*) Into what different natural regions would you divide the world? Give the reasons for your system of distribution. (B. U. 1933)

19. On a world outline map, mark the vegetation regions as follows:—

Deciduous forests (pale green)
Coniferous forests (dark green)
Tropical forests (pale red)
Grasslands (yellow)
Deserts (grey).

# CHAPTER XII

## GEOGRAPHICAL CONTROL

THE most important thing of all for you to understand in geography is what we usually call 'Geographical Control'. You must always remember that geography is not just a description of the countries of the world. That is only a small part of geography. When people began to study their own and other countries they were content at first just to find out facts. But soon they wanted to know 'why' and 'how' everything should be as it is. They soon found out that there were a few simple *causes* which were to be found all over the world and which control its development.

Geography, then, is the study of the Earth as the Home of Man, of the influence which the *natural environment* exercises on man and his activities. We have also to take account of the *efforts of man* to *make the most use* of the advantages of that environment or to overcome the disadvantages.

The Geographical Factors which go towards the making up of our natural environment are:—(1) Location or Position, (2) Physical Features, (3) Geological Structure, (4) Climate and Weather, (5) Vegetation and Soil, and (6) Animal Life. We shall consider them in detail in this Chapter.

1. **Location or Position.**—In our daily life, the question of the distance of our place of work from our home is a vital factor. Similarly does location play a vital part in the situation of an industrial town like Bombay or Ahmedabad. Such towns, in order to flourish, must be easily accessible from sources of raw material, residential quarters of workers, and from market places or ports where the finished goods are destined. *Human agency* takes care to annihilate distance and disadvantages of position by means of devices like the express train, the aeroplane, or the telephone receiver. The position of a country or a town relative to the world as a whole, i.e. to the equator and the poles, is a potent factor which we cannot alter, yet which determines climatic conditions. Thus Hudson Bay, the proper outlet for the

Wheat of the Prairies, is closed, during winter, for shipment, and a considerable proportion of the grain has to be sent out by the always-ice-free port of Vancouver, across the Rockies, and to Europe *via* the Panama Canal.

2. **Physical Features.**—The second factor which controls human activities is the physical nature of the land. If you live in one of the big towns of Bengal, such as Dacca or Calcutta, you know that you have to go very many miles before you see a big hill. Most of the country is flat, and there are paddy-fields everywhere. Yet in the Cardamom Hills of Travancore—with almost the same climate (same temperature, same rainfall)—there are very few paddy-fields because there is not much flat land where paddy can be grown. That is an example of the *control* of *physical features*—where the land is flat there are many paddy-fields, where the country is mountainous there are few.

3. **Geological Structure.**—The commercial activities of nations are determined by the distribution of minerals of economic importance. Man cannot put an iron-mine where iron ore has not been already provided by nature. The location of minerals is also of strategic importance. It was thus, during the recent War, that Hitler picked up a quarrel with Norway in order to have an easy access to the precious iron ores of Sweden. Hitler's negotiations with King Carol of Roumania, again, were carried on with the express intent of securing the oil stores in Roumania.

4. **Climate and Weather.**—In Rawalpindi or somewhere in the Punjab there is plenty of flat land, yet there are few paddy-fields. That is, of course, because it is too dry; the rainfall is not sufficient for growing paddy. Here we have an example of the *control of climate*. Again, you do not wear nearly as many clothes as people who live in cold countries do. This is climatic control. But these are not the only cases of geographical control. You can

take almost any fact in geography and you will find it has reasons. Many of you live in Bombay. Why has Bombay become such a great city? There is its position, its harbour—here we have the control of physical features again. You will learn later of its valuable 'hinterland', a rich district which sends all its products to Bombay. Or, again, many of you will be looking forward for April or May, for then you know you have your long school holidays. Perhaps you have never thought about it, but that is an example of climatic control. It is very difficult to work well at school during the hot weather, and so the holidays have been fixed for the hottest part of the year. In Burma the hottest months are April and May, so they are holiday months; in the Punjab, where June and July are the hottest months, the holidays are later. You can have no banana or palm trees in England.

From these examples you will understand what is meant by 'geographical control', and how important it is. There are *two* important factors—physical features and climate. In many countries the physical features almost make the climate. You will learn later how the physical features of a region control its climate.

5. **Vegetation and Soil.**—The next important thing for us is to learn how the control acts. Firstly, physical features and climate together control the distribution of *vegetation*. You cannot have paddy-fields on the sides of rugged mountains, and you cannot have forests where there is no rainfall.

6. **Animal Life.**—We have learnt that each type of climate has its own type of vegetation, which—in its turn—controls the *animal-life*. You do not find camels in the paddy-fields or jute-fields of the Ganges Valley, and you cannot feed sheep on forest trees. Each type of vegetation has its own characteristic animals. The agile monkey is

haracteristic of Equatorial forests, and the speedy antelope f open grassy plains.

Then we come to man. Man is really controlled by all hese factors—physical features, climate, vegetation, and nimal-life. But man can think and work and overcome ome of the natural control, though he can only do so after nuch thought or labour or expense. Where a town on the ea coast like Madras has no natural harbour he can build n artificial one; where a country is too dry to grow crops—lke the Indus Valley—he can bring water there and irrigate the land; he can move plants from one part of the world to another, cultivate them, and improve them; he can take animals and domesticate them and train them to do his work. But although man can thus alter some of the effects of nature, he is, in the main, controlled by his 'geographical environment'—that is, by the conditions under which he lives. See Fig. 73.

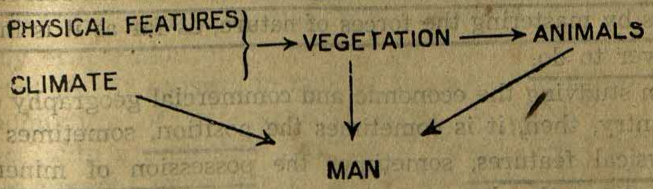


FIG. 73.—Diagram showing geographical control

The physical features and climate determine the natural vegetation, the natural vegetation determines the types of animals. The activities of men are determined by all these factors, but remember he is able to overcome some of them at least in part.

The factors of man's environment do not *determine* the details of the life of man, however much they may *influence* him. By a number of devices like the radiator or the refrigerator or air-conditioned houses man overcomes the disadvantages of extreme cold or of excessive heat. By careful breeding and selection it is possible to extend the range of crops, though only to a limited degree. Agricultural research in Canada has been largely directed to discovering varieties of wheat which will ripen with a shorter and shorter summer, with the result that the wheat belt has been extended farther and farther north. And since the climatic conditions of parts of Canada are repeated exactly in Russia, the lessons learnt by scientific experiment in one area can be applied in the other. So that while Primitive man is almost a slave to his environment, civilized man always devises means to get the better of his surroundings by mastering the forces of nature, as far as it is in his power to do.

In studying the economic and commercial geography of a country, then, it is sometimes the position, sometimes the physical features, sometimes the possession of minerals, sometimes the character of inhabitants that really forms the most significant and important geographical feature of the country concerned. Human activities in a certain region are mainly dependent on its characteristic vegetation which in its turn, is dependent on climate and soil.

## HUMAN CONTROLS

The Geographical controls which have been considered above cannot be materially altered by man. He cannot bring rain to a rainless tract. Yet he has introduced many artificial means of overcoming some of the difficulties and disadvantages that Geographical factors would impose upon him. He is constantly adopting new methods to meet his needs in different circumstances.

**Fertilisers.**—He can, for example, increase the fertility and productivity of the soil by the use of artificial fertilisers or manures. The following are the chief fertilisers:—(1) guano or the droppings of sea-birds obtained from islands off Peru and S. Africa, (2) Nitrates obtained from Chile orway and Germany, (3) Phosphates from North Africa nd (4) Potassium salts from Germany.

**Irrigation.**—Deficiency of rainfall is made good by artificial eans like Irrigation. Irrigation falls under two classes: ı) The Flood or Inundation Canal System, and (b) The erennial Canal System. The former is dependent on the nnual flooding of the river from which water is carried y canals to the fields. The latter is made possible by the onstruction of dams.

**Dry-Farming.**—In regions where the rainfall is normally ufficient for crop production, but where the moisture is ost by evaporation or porosity of the soil, dry-farming is esorted to. It consists in making the soil less porous by n admixture of impervious material or providing the urface with a protective covering of stones, waste paper, tc. to prevent evaporation. Dry-farming is practised in ustralia, Western U.S.A., Western Canada, and dry parts f the Deccan Plateau.

**Drainage.**—In water-logged countries like Holland and the ens of England the problem is one of draining surplus vater.

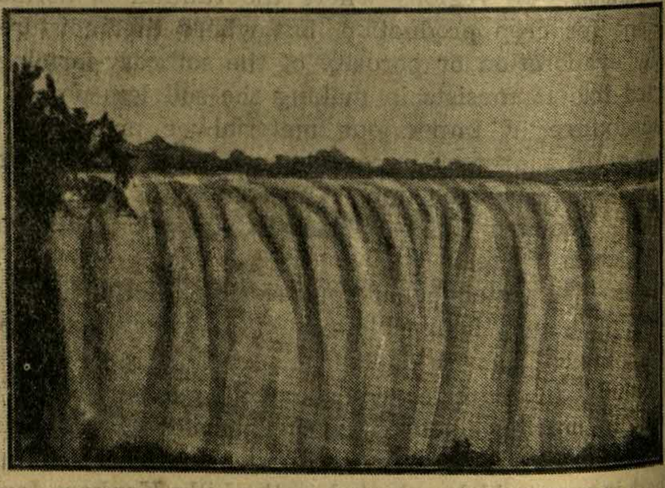
**Terracing.**—In countries where plain land is limited, the ystem of cutting terraces in the hill-slopes is practised n order to make cultivation and irrigation possible. Such nethod is very widely adopted in the hilly Konkan, Japan, China, Indo-China, Burma and the Swiss Mountain sides.

**Glass Houses.**—Temperature conditions in orchards are nodified to a remarkable degree by the introduction of glass houses, hot houses and forcing frames. This method is common in France and Germany. The cost of maintaining the machinery is enormous, but the production of special or early fruits and flowers yields a very high price in the market.

Tunnels, Bridges, Causeways overcome difficulties of communications over mountains, rivers or straits.

## MAN ON THE EARTH

You have learnt how much man is controlled by th climate and vegetation of the countries in which he live The more backward and uncivilised tribes are almost com pletely controlled by their surroundings, and as exampl we have the Pygmies of the Congo Basin, the America Indians of the Amazon, and the Eskimos of the Tundra As man grows wiser and begins to apply his knowledge, o as we say, becomes more civilised, he is able to overcom many of the disadvantages of his surroundings. He brin water in canals and makes deserts fertile—as he has done many of the dry parts of India; he clears away large are of forest and plants, crops suitable for food; he grows gra on the grasslands where formerly he wandered about wi only his herds. Again, he can build railways and ports that food can be brought quickly to even the most barre



(*Photo:* L. D. *Stamp*)

FIG. 74.—Victoria Falls (the main falls), Rhodesia. A great potent source of power, which has not yet been used by man.

desert places; telegraph lines and wireless stations keep every part of the world in direct touch with the great centres of life. Gradually man seems to be conquering the terrible diseases of the world, and it is now possible to live in unhealthy parts of the earth where formerly man found it difficult to remain alive.

There are still, however, enormous areas of the world where all the efforts of man are of little use. He cannot make fertile the great frozen wastes of the Tundra lands, because he is unable to prevent the ground freezing and the coasts becoming blocked with ice. He is unable to render fertile enormous hot deserts like the Sahara. Again in the regions of the great equatorial forests like the Amazon Basin his efforts to clear the forest and make room for cultivation are overwhelmed by Nature, who causes the forest trees to spring up again with persistence or washes away the soil left bare for a short time.

## THE GEOGRAPHY OF SETTLEMENT

Examine the map of the Distribution of World Population (Fig. 75, p. 136) and you will see that some parts of the world are more thickly populated than others. If we compare this map with that showing Distribution of Rainfall (Fig. 55, p. 88) we mark a close correlation between the two. The bulk of mankind is settled in well-watered regions.

Among the factors that *influence* the distribution of population are the following:—

1. **Climate.**—Cold is necessarily a limiting factor to extensive and close settlement and hence we find that, regions of low rainfall and of extreme cold in the far north, and those of extreme heat in low latitudes, are very sparsely populated.

Among the favourable climates are the following:—(1) The Monsoon climate of tropical lands, (2) the climates

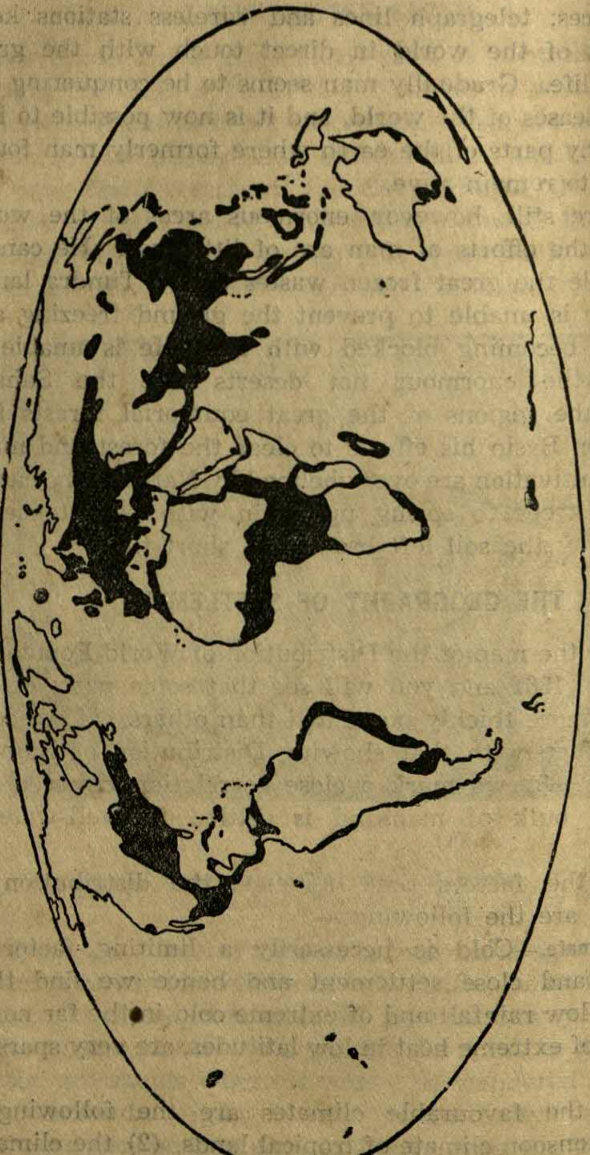


FIG. 75.—Population map of the world. All parts in black have more than eight persons living on each square mile of ground.

*(From French and Stamp's "Geography of Burma for Schools")*

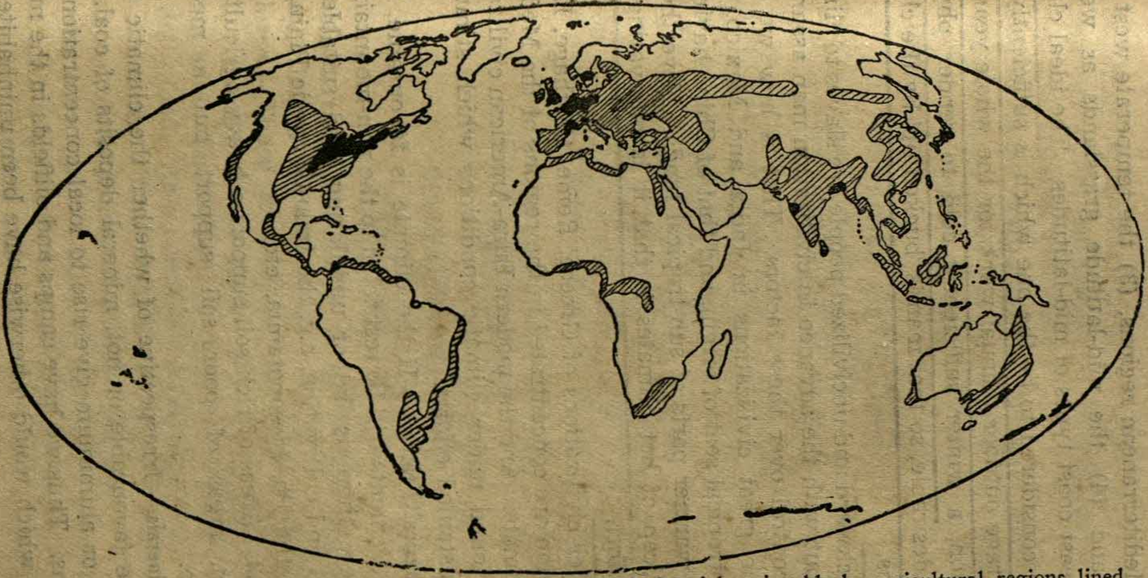


FIG. 76.—Agricultural and industrial regions of the world. Industrial regions black, agricultural regions lined.
(*From French and Stamp's "Geography of Burma for Schools"*)

of the Mediterranean regions, (3) the temperate west coast regions and (4) the mid-latitude grasslands as well as (5) the east coast types of mid-latitudes. The ideal climate to-day is considered to be the one which is sufficiently cool to encourage outdoor manual work for the whole year and, in addition, a winter sufficiently cold to render physical exertion desirable, so that man is 'bucked up' by the change in seasons.

The backward and uncivilized people are slaves to climatic control, but with the advance in civilization man assumes a greater control over these factors. That is how we come across the great civilizations in India and Mexico, each having a tropical seat of origin, and that of China having its origin in warmer parts of sub-tropical lands. Nevertheless the handicap of hot climates is that it is enervating and retards effort.

The older civilizations of Greece, Rome, Carthage, Egyp and Babylon are concentrated in the regions of the Mediterranean climate. And the modern Eura-American civilization is to be found under climatic conditions which stimulate man to sustained efforts.

2. **Physical Features.**—If the climate is favourable, man and his settlements will be restricted to the non-mountainous areas where there is flat or undulating land suitable for settlement and cultivation, e.g. the Indo-Gangetic Plain, the Valley of the Po, Mesopotamia, etc.

3. **Soil.**—Areas of rich soil support a heavy agricultural population, areas of poor soil support but a meagr population.

4. **Minerals.**—Irrespective of whether the climatic conditions are favourable or not, mineral deposits of coal, oil iron, gold or aluminium give rise to local concentrations o populations. Thus we have camps and oilfields in the mids of deserts which would otherwise have been uninhabited.

5. **Supply of Water.**—Man naturally likes to settle near a ure supply of water, and this factor determines the position f towns and villages everywhere.

6. **Central Position** with respect to man's scene of activity. -Towns which, by their position, serve as administrative entres, or route centres or market centres, tend to become arger than others.

## QUESTIONS AND EXERCISES

1. What do we mean by Geographical Control? Give instances to show hat our life is influenced by geographical environment.

2. Describe the life of the 'Shepherd Kings' of the Steppes or of Argentina or of the Australian 'Squatter', and contrast it with that of Agricultural Communities in the Indo-Gangetic or Nile Valleys.

3. Quote instances to show that man gets the better of his surroundings by dint of his intellect. Refer to some modern improvements in agriculture, housing and means of communication.

4. (*a*) What geographical factors influence the distribution of population in a country or continent? (*b*) Why are the following regions thickly populated?:—The Gangetic Plain, China, Mid-Europe, the Valley of the Nile, Eastern part of U.S.A. (*c*) Account for the sparse population of Siberia, Canada, Rajputana, the Amazon Basin.

# CHAPTER XIII

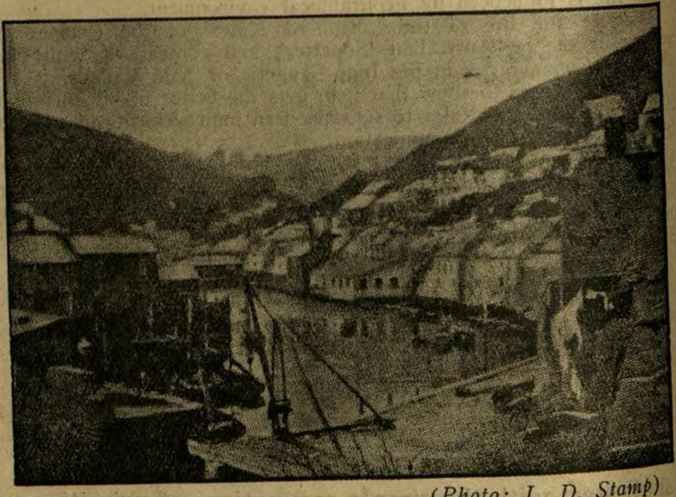
# OCCUPATIONS OF MAN

## PRIMITIVE PEOPLES

WE shall start with the simple occupations of primitive man before he learns the arts of civilisation.

**Gatherers.**—There are still a few peoples in the world who live mainly on the fruits or roots of plants they find growing wild. Their life is spent in gathering sufficient for their daily food. As a rule they are hunters too, and sometimes fishermen. They wander about from place to place in their search for fruit and animals. They are only able to make the very poorest huts or dwellings. The men and women have a hard life; they often die of hunger, they are often small in stature and weak. We find such peoples both in the thick forests of the equator—the Pygmies of Africa and the Americans of the Amazon—and on the fringes of deserts—the Bushmen of South Africa and the Australian natives. Often they have fled to these inhospitable regions because stronger and more civilised tribes have taken possession of all the better lands.

**Fishermen.**—We find people who depend mainly on fishing for their existence all over the world, both amongst backward and amongst highly civilised races. In the frozen



(*Photo: L. D. Stamp*)

FIG. 77.—A fishing village in England.

Notice the small harbour with the fishermen's boats, and the fishermen cottages built of stone or brick so that the people can keep warm in t cold winter.

north are to be found the Eskimo and the inhabitants of t Barren Lands of North America; in Equatorial regions a peoples like the 'Sea Gypsies', who live amongst the islan of Lower Burma and Malaya. There are some regions of t sea which are specially suited for fish and where fish a found in enormous numbers. Such regions attract men the civilised nations, and they spend their lives as fisherm

Examples are Newfoundland, off which island are the Great Banks famous for cod; the western coast of Canada, where the rivers are full of salmon. You all know the tinned salmon sold all over India; much of it comes from here. Then there is the Dogger Bank in the North Sea, which attracts fishermen from England, Norway, and Germany. Most fishermen spend much of their time on their boats, but build villages and towns along the nearest sea-coast, where their wives and families dwell and where they can live in stormy weather. Some fishermen have to go great distances to their fishing ground—such as those who go after whales in polar seas. Fishermen, too, are usually skilful swimmers and divers, and most nations who in their early days were very largely fishermen have developed into great sea-faring nations. Examples are the Norwegians, Britons and Japanese.

**Hunters.**—All over the world wild animals are becoming more and more scarce, and there are now few peoples who live entirely by hunting. In the old days little groups of men or tribes wandered about the great grasslands of the world in search of animals for food. Good examples were the North American Indians—'Red Indians' as they are often called, although they have no connection at all with the inhabitants of India. Many of the peoples of Africa were also hunters. The men did most of the hunting, while the women stayed behind to prepare the food and make rough shelters for the hunters when they returned. Where once the Indians roamed across the prairies of America we now find trains roaring along loaded with grain from the far-stretching wheat lands which have replaced the wild grassy plains. Hunting is still important in the far north, but the animals are no longer hunted for the sake of food but for the sake of their skins and furs.

**Lumbering.**—An occupation of man living in the great forests of the world, especially in the great northern forest of softwood trees, is 'lumbering'. By lumbering is meant he cutting down of the trees for lumber or timber. The rees are felled by axes and saws, dragged by animals (horses in colder lands, buffaloes and elephants in hotter ands such as India) to the rivers and there floated down o the saw-mills or ports.

**Shepherds.**—Whilst the people of the grasslands of Africa and America were until recently hunting wild animals, the inhabitants of similar regions in Europe and Asia had for thousands of years been keeping flocks of sheep, goats, and cattle. For travelling and for moving about rapidly to tend their flocks they kept horses and asses and became very skilled horsemen. In the old days a man's wealth was reckoned by the number of sheep and cattle he possessed, for from them he and his family supplied all their needs: food, drink (milk), clothing (from wool), and even their dwellings, which were made of skins. Water was often scarce in the grasslands and was carried about in bottles made from the whole skins of animals, just as we see it being carried about in many parts of India to-day. The shephered peoples had to wander about from place to place in search of good grass, and often, in bad years, they moved far away and found some fertile land where they drove out the native inhabitants and settled down to farming.

**Farmers.**—A large proportion of the peoples of India can be classed as farmers or cultivators. We find all stages from the hill tribes of Burma and Assam, who make a small clearing in the forest around their village and grow just sufficient for their daily food, to the cultivators whose life is devoted to the production of quantities of paddy, not only for themselves but for sale. Let us consider here the primitive farmers who have only their own wants to consider. As a rule they build a small village with huts which are just sufficient for shelter from sun and rain, and constructed of the bamboos of the local jungle and thatched with grass or leaves. They keep a few cattle, usually for ploughing, and perhaps the headman of the village may possess a pony. A small area of forest is cleared—in this country it is often cleared by burning, so that the ashes of the trees nourish the ground—and a few crops grown. After one, two, or more years when the soil becomes poor another area of forest is cleared. This process is wasteful, and large areas of valuable forest have been destroyed in this way in Burma, Malay Peninsula, and other countries. In the drier parts of India and Burma sesamum or millet is the principal grain; in the wetter parts flat areas are cleared and paddy is grown. Around the villages bananas, mangoes, and a few other fruit-trees and palms may be planted.

## CIVILIZED PEOPLES

Primitive people who live entirely on what they themselves can grow or make must be content with a very little. As soon as people learn about the world around them they realise that there are many things they can do to improve their own existence, but at the same time that there are many most desirable things which they cannot produce themselves. Civilisation commenced when people began to realise that they should strive to better their existence. Gradually man realised that the natural grains and fruits could be improved by cultivation, and so agriculture improved. Then came the knowledge that for efficient working some must devote themselves to one kind of work and some to another (division of labour). Later came the knowledge that many of the comforts they desired could only be obtained from outside countries, and foreign trade commenced.

If we look at any civilized country at the present day we notice that there are different sections of the people who each have their particular work to do, yet each group is essential to the life of the country. There are the farmers or cultivators who produce the food, the merchants and shopkeepers who buy and sell, the people who work the railways, steamers, and other means of travelling from one place to another, the builders who construct the houses, the teachers who look after the education of the children, and so on. We find, too, that every country produces something which it is able to send away to other countries, and every country has something which it must receive in exchange. Some very big countries can produce most of the things they require, but not all.

**Agriculture and Industry.**—If we look at the whole world we find we can separate the people into two broad classes. There are the people who grow things and the people who make things. The growing of things can be grouped under the term 'agriculture', and the making of things under the term 'industry'. In its simplest form trade consists of the exchange of food for manufactured articles: it is an exchange between the people who grow things and the people who make things. Although nearly all countries both grow and make things, usually one is more important than the other and so each country or each big region of a country can be classed as 'agricultural' or 'industrial'. Look at Fig. 76; it shows the main agricultural and the main industrial regions of the world. Fig. 75 shows you the most thickly populated areas in the world. Notice that both agricultural and industrial regions may be thickly populated. India, except for small areas around Bombay and Calcutta, is an agricultural country.

**Agriculture.**—Perhaps agriculture is the most important o all, because it supplies the main food of the people. W can distinguish three main kinds:

(*a*) *Crop farming*. The growing of 'crops' of grain i large quantities, such as paddy, wheat, barley, etc. Wit this we can include cotton, flax, etc., which are grown no for food but for clothing.

(*b*) *Stock farming*—that is, the rearing of cattle an sheep. This is not really 'agriculture', but is usuall included under it. The animals are reared both for food (*i.e.* meat), including milk and cheese which is made from it, and also, in the case of sheep, for wool for clothing.

(c) *Mixed farming*, when each farmer grows a variety of crops according to local needs, or according to the suitability of his soils, and also keeps some cattle or sheep.

Mixed farming is very important in thickly populated countries like England. The farmers grow vegetables for the local markets, grain such as wheat or oats, and keep cattle (for milk and butter as well as for meat) and sheep (for meat as well as for wool). There are several reasons why this is done. Firstly, there is the local market; the people in the neighbouring towns require a great variety of foods. But there is something more important than this. Each crop, when it grows, draws a certain amount of nourishment out of the ground. Different crops require different things. Thus if the farmer grows wheat in one field year after year the wheat will soon draw from the soil all the substances which wheat requires. As a result the crop gets poorer and poorer. If, instead of doing this, the farmer changes the crops every year he will get much better results. One year he can grow wheat, the next year vegetables, the third year some other crop. Or sometimes he can let natural grass grow for a time and let cattle or sheep feed on it. Changing the crops year by year is called 'rotation of crops'. A very usual plan is only to grow wheat every four years. We must put into the ground firstly plants which require one substance, and then plants which require another. There are two ways in which the whole supply of plant foods in the soil may be renewed. One is by allowing the soil to 'rest', or, as we say, remain 'fallow', when the agents of weathering cause changes in the soil and it recovers its supply of various plant foods. Or we may add animal manure—horse and cow dung is much used—or chemical manures. The nitrate manures from South America are much used in Europe. In thickly populated countries, where the ground is too valuable to be allowed to lie fallow even for one year, manuring is usual, but in huge grain farms, as in the open prairies of Canada, the ground is often allowed to lie fallow. The system of manuring and rotation of crops is called 'intensive cultivation'. The yield is very good in such cases. For example, in England and Denmark the farmers get 35 bushels of wheat from every acre sown, but in Canada or the Argentine, where enormous areas are covered, the yield is only 10 or 12 bushels per acre. Mixed farming is carried on especially in the countries of North-Western Europe and North-Eastern United States.

**Mining.**—Mining and quarrying also, are importan occupations in most civilised countries. There are, o course, other occupations in civilised countries, but again w can divide them into the producing and the manufacturing Mining is often very important, and we can divide minin and the industries connected with it into the producing sid —that is, mining the coal or minerals from the earth—an the manufacturing side, when the metals are obtained fro their ores and made into useful articles. The most essentia point to remember is that in primitive peoples we only ha to consider their main occupations because the wants o the people are slight and they supply them all themselve Even in the most primitive and backward tribes, howeve there is some sort of 'division of labour'. We said tha with the hunters, the men do the hunting whilst the wome look after the cooking and domestic arrangements. As th people become more and more civilised the 'division o labour' becomes more and more marked and every one ha his own particular work to do, and often it is quite differen from that of his neighbours. One man may be a clerk another a shopman, another a farmer, another a miner another a railwayman, and so on. Yet all of them ar equally important to the country.

### QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers with diagrams, sketch-maps, etc.

1. Mention the conditions favourable for:—
   (*a*) Sheep-rearing.
   (*b*) Cattle-raising.
   (*c*) Dairy-farming.
Name those parts of the world where these industries are carried on extensively. (B. U. 1934)

2. Name the important farming regions and describe the work carried on in any one of them.

3. What are the chief occupations followed by the peoples of the world? Account for their location in the different parts.

4. Give the factors that influence distribution of population. Illustrate by means of sketch-maps the most densely populated parts of the world. Which parts are thinly populated and why?

5. "In Monsoon lands the areas of densest population and heaviest rainfall coincide." Show with the aid of sketch-maps how far this is true of India, and why. (U.R.I.A. 1926)

## CHAPTER XIV

# THE REARING OF ANIMALS FOR COMMERCE

**Fish.**—Most of the important sea fisheries of the world are found in temperate waters. Fish require broad expanses of shallow sea, where the food supply—in the form of minute animals and plants—is abundant. The great fisheries are therefore restricted to regions where there is a broad continental shelf, the four important ones in the world being:—

(*a*) The North Pacific Coast of Oregon, Washington, British Columbia and Alaska.

(*b*) The North Atlantic Coast of Labrador, Newfoundland, Canada and the New England States.

(*c*) The Coasts of North-Western Europe, including the North Sea.

(*d*) The Coasts of Japan.

**The North Pacific Coast.**—The great speciality of the fishing industry is the catching of salmon for export in tins (canned salmon). It is carried on mainly in the rivers and creeks of Alaska, on the Fraser, Skeena and Naas rivers and the numerous inlets in British Columbia and in th Columbia and Sacramento rivers of the United States. Th true sea fish caught along the same coast include co halibut, and herring.

**The North Atlantic Coasts of America.**—The value these fisheries was appreciated very soon after the discover of America. The fisheries on the Great Banks south of Ne foundland are open to all, but the rights of 'inshore' fishi are limited by treaty.

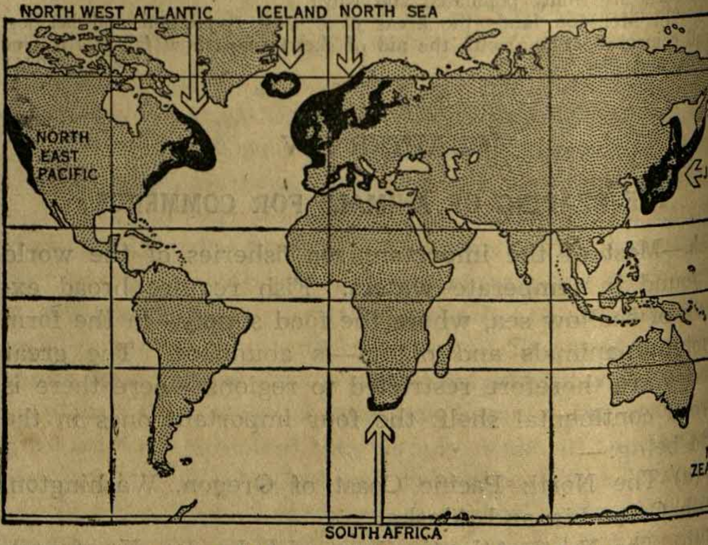


FIG. 78.—Map of the World showing fisheries.

**North-Western Europe.**—These fishing grounds extend f Lapland to the coast of Morocco, and include the coas Iceland. The most important area is the North Sea. shore fishing rights are reserved, but the main North grounds are shared by British, Norwegian, German, D and other fishermen.

**The Coasts of Japan.**—The Japanese fisheries are reater value than those of any European country even cluding Britain. Herring, haddock and sardines are bundant as well as other good fishes, such as the bonito, ot found in the other areas.

**Other Fishing Areas.**—Other important areas include the Western Mediterranean (sardines, anchovies, and tunny); New Zealand and South-Eastern Australia; Cape of Good Hope; Great Lakes of North America (whitefish). Oysters lourish in tidal estuaries, especially in the inlets on the tlantic Coast of North America, the mouths of the Thames nd the Rhine in Europe.

**Cattle.**—In India we are accustomed to think of cattle eing kept principally to draw carts along the roads and treets, or for ploughing. The cows are not nearly so aluable as the bullocks. Some of the people eat the meat nd a few people drink the milk, but meat and milk are not mportant articles of food when compared with rice.

In other countries it is quite different. In Europe and merica cattle are practically never used for ploughing r for pulling carts. Big strong horses do the ploughing nd smaller horses draw carts. In such countries, too, there re good roads and railways everywhere, so that motors and rains are used much more. In thickly populated countries here mixed farming is carried on, cattle are kept for two urposes. The cows (which are more valuable than the ullocks) are kept for the sake of their milk. People in orthern Europe and a large part of North America use an normous quantity of milk. From the cream of the milk utter and cheese are made. Keeping cattle for the sake of he milk, butter, and cheese is called *dairy farming*. The ullocks are usually killed when quite young for the sake f their flesh.

Cattle thrive best where there are fine rich grasslands, and e find them living on the cooler parts of Tropical grassland nd the wetter parts of Temperate grassland. Where, as in

Canada, Argentine, and part of Australia, there are en mous areas of suitable grassland, cattle are kept in g numbers, and here it is mainly for the sake of their fl White people eat large quantities of beef—the flesh of cat Meat is sent from one part of the world to another 'chilling' it to 30°F. or freezing it hard (when it ke longer). Thus a great proportion of the meat eaten Europe is sent right across the equator from the Argent In all countries where cattle are kept, the skins or 'hides the animals are important. From them leather is obtai

Good grass for cattle grows under similar conditions those required by wheat, and in many countries we cattle rearing is being given up for wheat farming.

**Sheep.**—Like cattle, sheep are kept for more than purpose. They may be kept for the sake of their w (from which clothing is made) or for their flesh (ca mutton). The sheep which yield the best wool do always yield the best mutton, and the animals have to fed according as whether the wool is required or the fl

Sheep do not require such good grass as cattle, and found in poorer, drier regions. Thus in any grassl country we usually find cattle in the damper parts sheep in the drier, but both are found in the same cou Thus in England cattle and oats thrive on the west side of the country); sheep and wheat on the dry ea side.

**Goats.**—Goats can live on still poorer grass and in all of climates. Notice the herds of goats kept in all the parts of India. Their milk is used and also their flesh they are not nearly so important as sheep.

**Silkworms.**—Besides wool the most important a products of which clothing is made is silk. It is ob from the silkworm which generally feed on mulberry The silkworm is a native of South-East Asia. Both th worm and the mulberry are indigenous to China, an

ably from China that the art of silk-culture and manu-
re gradually spread westward. The silk industry like
requires much careful labour and therefore monsoon
warm temperate lands with their dense population and
berry groves on hill-sides have special advantages, so far
his industry is concerned. The silk industry is a most
ortant one in Japan and silk is the largest item in the
of exports. In the early days of the East India Company
weaving was one of the principal textile industries of
ia. She had, indeed, a great name in the past, both in
West and the East for her silk and muslin, but she has
t her former glory. Her place as a manufacturer in the
k industry is now occupied by France, Italy, Britain and
her European countries.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers with diagrams, sketches etc.

1. How do the animals of temperate lands differ from those in hot
ds?

2. "Man's character and occupations have been determined by the
ographical conditions under which he lives." Explain this statement,
ing examples.

3. Name the principal races of mankind.
State what proportion each of these races forms of the total population
the world. Name the principal countries over which they are
tributed. (B. U. 1928)

4. What are the chief occupations of people who live in (*a*) steppes,
) mountains, (*c*) savana land, (*d*) deciduous forests? Show how the
ographical and climatic conditions have decided these occupations in
ch case.

5. In certain parts of the world the people are engaged in only one
cupation—stock-raising. Name these parts of the world, and explain
y the rearing of cattle is the only occupation.

6. Write an account of either the people who live in the cold forests
Russia and North Siberia, or the Kaffirs, who live in the grasslands of
uth Africa, using the headings:—
(*a*) Where they live—climate and other conditions.
(*b*) The houses they live in—their clothes—their food.
(*c*) Their occupations—brief description of how they carry them on.
(*d*) How they travel. (A.V.M.S. Bur., 1925)

7. Write an account of the people who live either in the Tundras o the Coniferous Forests under the following headings:—
   - (*a*) Climate and other conditions in which they live,
   - (*b*) their food, clothes and houses,
   - (*c*) their occupations, and
   - (*d*) their mode of travel. (B. U. 1

## CHAPTER XV

## THE RAISING OF COMMERCIAL CROPS

BESIDES cultivating food grains, man grows fibre plants a also juice-plants that yield him useful oils. Plants n suitable soil and suitable climate, and therefore, those t grow in some parts of the world are different from th that grow in other parts. Roughly, they may be grou according to climatic conditions as follows:

| Hot | Warm | Cool | All Clim (more or |
|---|---|---|---|
| Rice | Maize and Pulses | Wheat | Potatoes |
| Sugar-cane | | Barley, Rye, Oats | |
| Coffee | Tea | Sugar-beet | Peas and be |
| Fruits—bananas, dates, mangoes, cocoanuts | Fruits—lemons figs, grapes, oranges | Fruits—apples, pears, plums. | |
| Oils—cocoanut, palm, castor | Oils—Cotton-seed, sesame, linseed, Olive. | | |
| spices. | | | |

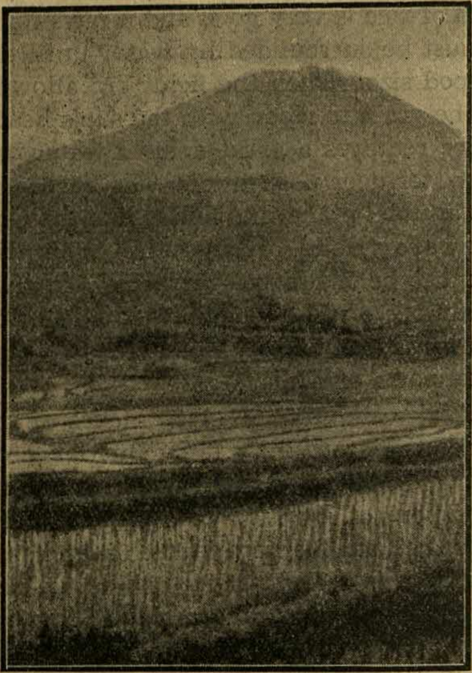
Let us now consider some important crops and produc in the world.

**Rice** is the most important food grain in hot wet countri In its requirements it is different from other grains.

eds must be sown in a clayey or loamy soil under a few ches of water, and the young plants grow up through the ater. As a rule the seeds are sown in 'nurseries' and ıen the young plants are taken up and planted out by hand ı small tufts—again under water. This is very hard work, ut the yield of rice is very good and it pays for the trouble. he roots must be surrounded by water until the plant has eached a good size. Then the fields are allowed gradually o dry and the grain to ripen with the sun's heat. It will be een that rice requires a great deal of water and flat land, so that the water does not run off. The best land for rice is n the great alluvial plains and deltas like the Ganges Valley and the Irrawaddy Delta. In more hilly countries paddy or rice fields must be made by 'terracing', so that the fields are like a number of flat steps down the hill-side or valley. We see this in Ceylon and in many parts of Burma as well as in various parts of India.

To do well rice requires 60 or 80 inches of rainfall; with less than that the crops may fail. But large quantities of rice are grown in irrigated areas, such as the Indus Valley and the dry part of Burma, where the water is brought artificially to the land by canals which man has made. Rice with the husk on is called paddy, and so we nearly always talk about 'paddy-growing' and 'paddy-fields'; but European peoples, who only see the paddy when the husk has been removed, call it 'rice'.

In monsoon countries the seed is sown during the rains, and gradually ripens as the rains cease, and is ready for cutting in the cold weather or a little later. In countries nearer the equator, where there are two rainy seasons, two crops a year are often possible. We saw that the Warm Temperate Oceanic Climate is very like the Monsoon Climate, and it is also very favourable to rice. Notice in what parts of the world we find (*a*) Monsoon Climate, (*b*) Equatorial Climate, (c) Warm Temperate Oceanic Climate. These will be the rice-producing areas, and more rice will be produced where the lands are inhabited by civilised peoples. A little rice can be grown in some parts of the Mediterranean regions where there is sufficient water. The grain grows in the warm moist winter and ripens in the early part of the hot summer. Look at the map and notice the countries.



(*Photo: L. D. Stamp*)

FIG. 79.—Paddy terracing (Java).

Notice the large number of small fields cut down the side of the hill, so that no land is wasted.

**Maize or Indian Corn.**—This grain does not require as much water as rice; it grows, too, in cooler places. It is

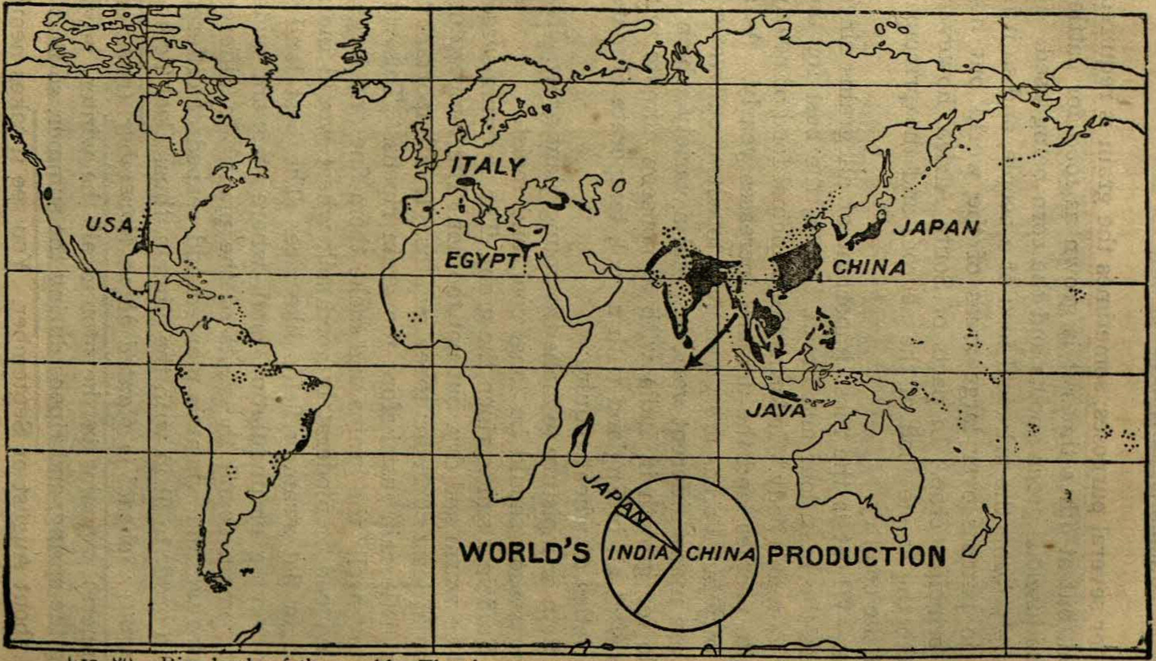


FIG. 80.—Rice lands of the world. The three arrows show the regions from which rice is exported. Notice that China and India, which grow most rice, have none to spare for export. Rice is exported mainly from Burma, Siam, and French Indo-China.

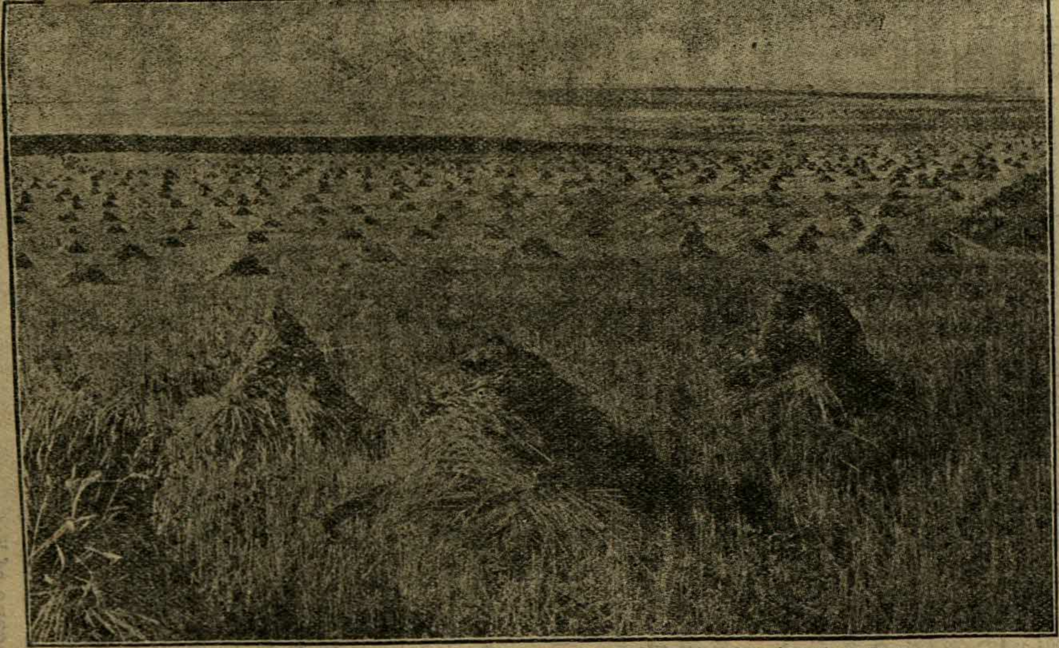
grown for several purposes; sometimes the grain is required for food, but at other times it is grown as food for cattle, both the luscious green shoots and the corn being used. It only rarely forms the principal food of a people, and so it is grown in patches over large areas of the world but not as the principal crop. In parts of South Africa, however, it is both the staple food of the negroes and the principal crop of the country.

**Wheat.**—Wheat is the most important of all grains since it makes the best flour and bread, that is, the best for the growth of man's body. It forms the principal food of nearly all white peoples, and the demand increases yearly. As a result very large areas are given over to wheat cultivation. There are many different varieties, and a variety which is suitable for growth in India with a monsoon climate will not grow at all in England with a cool, temperate climate. All varieties of wheat require:

(*a*) Rain or moisture to make the young plant grow. The growing season should be long, cool, and moist.

(*b*) Sufficient sun to ripen the grain. The ripening season should be warm and dry, but not too hot. The temperature must be at least 60°F. for three months. It is important to have a little rain just before the grain ripens. This rain helps to 'swell' the grains and make them fine and large.

(*c*) A good or moderately good soil; wheat would die if planted in flat swampy fields like rice. The best land is gently waving or undulating land, where stagnant water cannot remain round the roots of the plant. In different countries we find wheat is planted and reaped at different times in order to fit in with the climate, thus: *Cool Temperate 'winter wheat' is planted about November* (norther hemisphere), remains in the ground all the winter, grows during the spring, and ripens during the summer, so that it is cut about August or September. You see it takes nearly



(*Photo: Govt. of Canada, Immigration Dept.*

FIG. 81.—A wheatfield in Alberta, Canada. Crop farming on the Prairies. Notice the huge area devoted entirely to wheat.

a whole year. *Temperate 'spring wheat'* is sown in the spring after the winter frosts and snows have gone, but is cut at the same time as the winter wheat. *Tropical Climates* (*as India*)—Here the seed is sown in the latter part of the rains, and is ready for cutting in the early part of the hot season—January or February in India—but before the great heat commences. It is important that it should have a little moisture about the end of December in order to 'swell the grain.'

**Wheat** is a *grass* which has been carefully cultivated by man. Like the natural grasses, it will flourish best in the Grassland Climates of the world. Find where the Temperate Grasslands occur. These are the principal wheatlands of the world. Wheat also grows well in the drier parts of the Cool Temperate Oceanic Climate. The deciduous forests of these lands have been cleared and wheat grown. England has this climate, but nearly all the wheat grows in the drier eastern part. Wheat flourishes in Mediterranean climates.

**Oats, Barley, and Rye.**—These are other important grains of temperate lands. They flourish where wheat flourishes, but will also grow in colder climates and poorer soils, and hence are found farther north in the northern hemisphere. Oats like a cooler and damper climate than wheat, barley will grow in a great variety of soils and climates, whilst rye will grow in the poorest soils and in climates too severe for wheat. But they all belong mainly to the temperate zone.

**Millets.** —Millets of different kinds are important grains in the Tropics, especially in India, where they grow with a very much smaller rainfall than rice. All over the drier parts of the Deccan they furnish the principal food grain of the people.

**Sugar** comes from two entirely different sources—the sugar-cane of hot wet countries, which you all know, and the

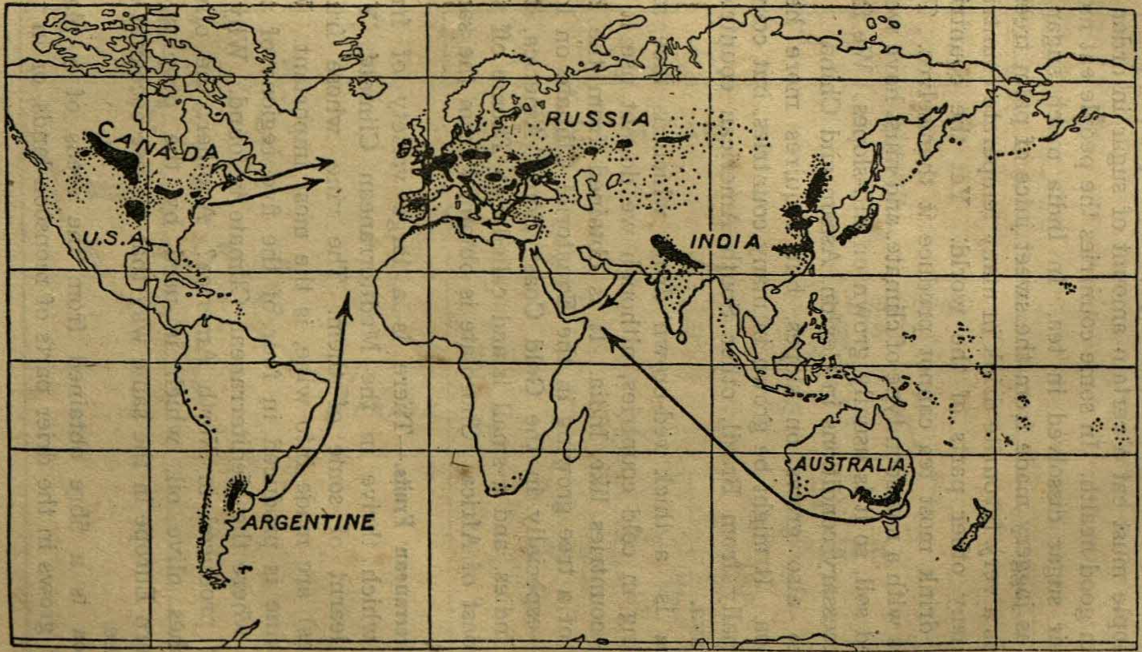


FIG. 82.—Wheatlands of the world. Europe (except Russia) eats more wheat than she can grow and so imports from Canada, U.S.A., Argentine, India and Australia.

sugar beet (which is a 'root crop') of temperate climates. All people must eat a certain amount of sugar in order to keep in good health. In some countries the people eat most of their sugar dissolved in tea. In India much sugar is eaten as jaggery made from the sweet juice of palm trees.

**Tea** is a very favourite drink in many temperate countries and many other parts of the world. Yet the countries which drink most tea cannot produce it themselves. Tea thrives with a monsoon type of climate, and must have well-drained soil, so it is usually grown on hill-slopes. We find the necessary conditions in Ceylon, Assam and China.

**Coffee** also grows on slopes, but requires more heat than tea. It might be grown in many countries, but comes principally from Brazil, other South American countries, and Java.

**Cocoa** is a thick red-brown drink which is nice and warming in cold countries, although we do not use it in warm countries like India. It is obtained from the big beans of a tree growing in the Equatorial Climate on low lands—especially in the Gold Coast, South America, the West Indies, and a small island called Sao Thome off the east coast of Africa. Chocolate is obtained from the same source.

**Mediterranean Fruits.**—There is a large variety of fruit trees which thrive in the Mediterranean Climate. You have learnt of some of them. The vine, whose fruits (grapes) are made into wine, is the most important. We find wine is produced in four of the five regions of the world where the Mediterranean Climate is found. Why is it not produced in North America? Another, the olive, furnishes olive oil, which is used by the peoples of southern Europe in the same way that we use cocoanut oil or ghee.

**Cotton** is a fibre obtained from the seeds of a plant which grows in the drier parts of monsoon lands, or in the

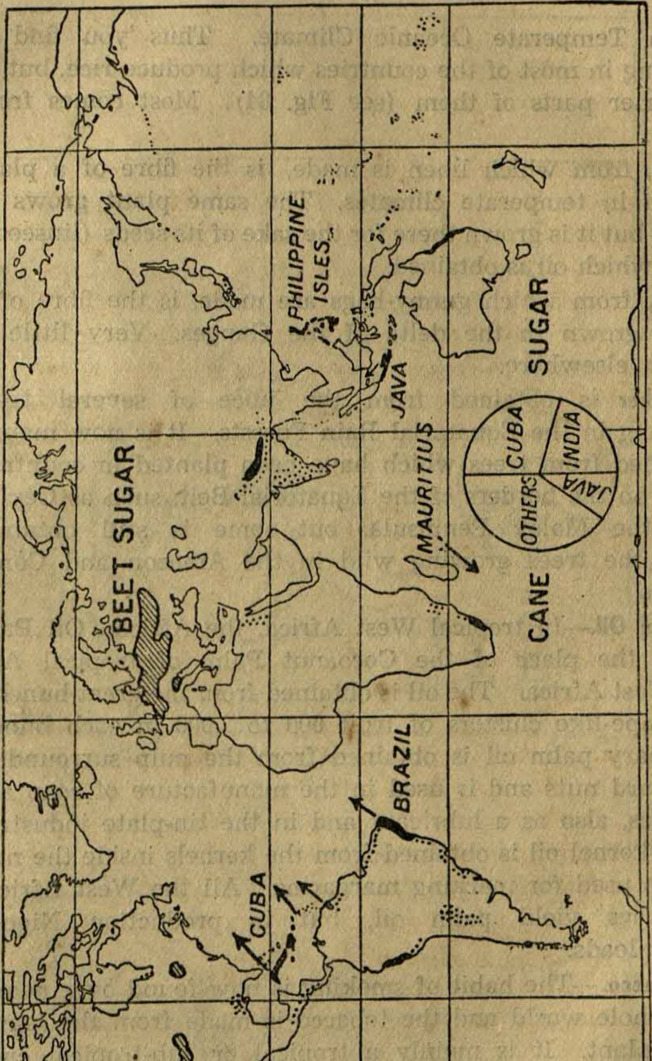


FIG. 83.—Sugar-producing regions of the world. The arrows show the exporting countries. The diagram at the bottom of the map is the total production of cane sugar.

Warm Temperate Oceanic Climate. Thus you find it growing in most of the countries which produce rice, but in the drier parts of them (see Fig. 84). Most comes from U.S.A.

**Flax,** from which linen is made, is the fibre of a plant grown in temperate climates. The same plant grows in India, but it is grown there for the sake of its seeds (linseed), from which oil is obtained.

**Jute,** from which gunny-bags are made, is the fibre of a plant grown in the delta of the Ganges. Very little is grown elsewhere.

**Rubber** is obtained from the juice of several trees growing in the Equatorial Rain Forests. It is now mainly obtained from trees which have been planted in countries in or on the borders of the Equatorial Belt, such as Ceylon and the Malay Peninsula, but some is still obtained from the trees growing wild in the Amazon and Congo Basins.

**Palm Oil.**—In tropical West Africa, the African Oil Palm takes the place of the Cocoanut Palm of tropical Asia and East Africa. The oil is obtained from the great bunches of grape-like clusters of fruit 600 to 2,000 in each bunch. Ordinary palm oil is obtained from the pulp surrounding the hard nuts and is used in the manufacture of soap and candles, also as a lubricant and in the tin-plate industry; palm-kernel oil is obtained from the kernels inside the nuts and is used for marking margarine. All the West African countries yield palm oil, but in production Nigeria easily leads.

**Tobacco.**—The habit of smoking is now found over nearly the whole world and the tobacco is made from the leaves of a plant. It is mainly a tropical or sub-tropical crop, but if protected from frost can be grown in temperate lands. It is generally true that heavy soils produce a stronger tobacco than light soils.

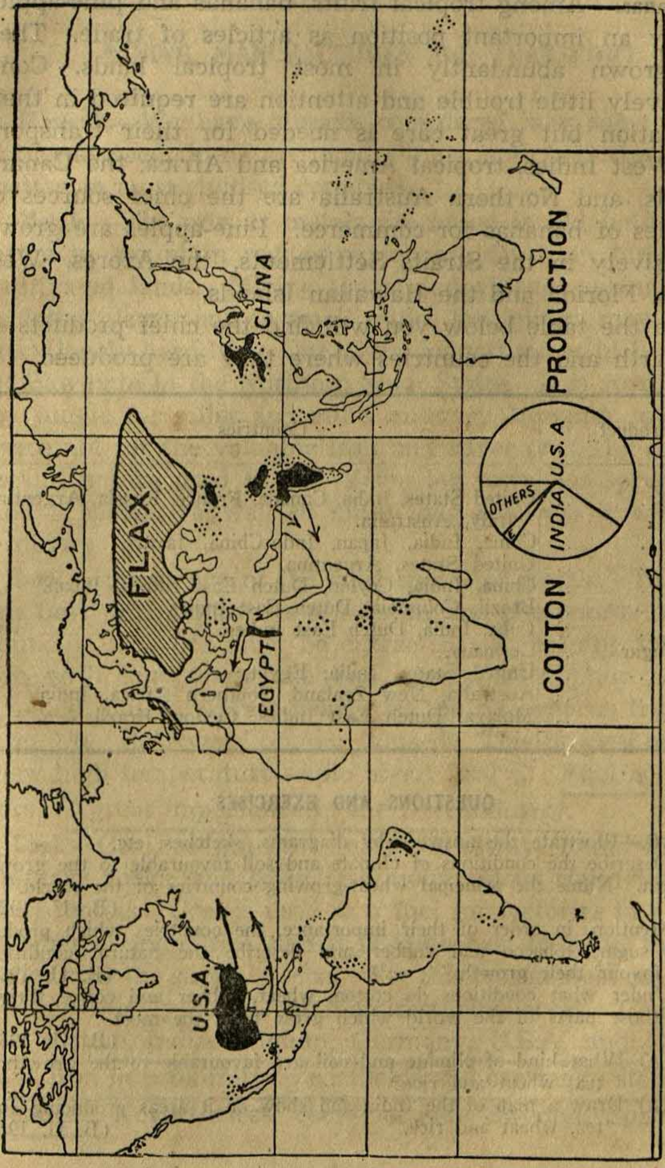


FIG. 84.—Cotton and flax-producing regions of the world. The arrows show the countries which export raw cotton.

**Bananas.**—Among tropical fruits, bananas and pine-apples occupy an important position as articles of trade. They are grown abundantly in most tropical lands. Comparatively little trouble and attention are required in their cultivation but great care is needed for their transport. The West Indies, tropical America and Africa, the Canary Islands, and Northern Australia are the chief sources of supplies of bananas for commerce. Pine-apples are grown extensively in the Straits Settlements, the Azores, West Indies, Florida and the Hawaiian Islands.

In the table below you will find the chief products of the earth and the countries where they are produced.

| Product | Countries |
|---|---|
| Wheat | United States, India, Canada, France, Russia, Argentina, Italy, Australia. |
| Rice | China, India, Japan, Indo-China, Java. |
| Maize | United States, Argentina. |
| Tea | China, India, Ceylon, Dutch East Indies, Japan. |
| Coffee | Brazil, Columbia, Dutch East Indies. |
| Sugar | Cuba, India, Dutch East Indies. |
| Beet-Sugar | Germany. |
| Cotton | United States, India, Egypt. |
| Wool | Australia, New Zealand, Southern Africa, India. |
| Rubber | Malaya, Dutch East Indies, Ceylon, Brazil. |

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches, etc.

1. Describe the conditions of climate and soil favourable to the growth of wheat. Name the principal wheat-growing countries of the world. (B. U. 1927)

2. Mention, in order of their importance, the countries which produce wheat, sugar, tobacco and rubber and describe the natural conditions which favour their growth. (B. U. 1929)

3. Under what conditions do cotton, wheat, rubber and coffee thrive? Name those parts of the world which grow them the most. (B. U. 1935)

4. (*a*) What kind of climate and soil are favourable to the growth of tea, wheat and rice?
   (*b*) Draw a map of the India and show on it areas producing coal, tea, wheat and rice. (B. U. 1933)

## CHAPTER XVI

## MINING, MANUFACTURES AND TRANSPORT

**Minerals.**—We have already considered how some of the minerals occur in nature ; and mining is an important occupation in most civilised countries.

**Metals.**—The ores of metals are found in old hard rocks, often in mountain regions which are far from towns and cultivated lands. Mining towns and villages spring up in isolated places, and in small mines the miners may lead a very lonely hard life. One of the biggest mines in Burma is at Bawdwin in the Northern Shan States. It is surrounded by jungle for miles and miles in every direction, and if it were not for the valuable lead and silver ores, the country would not be used at all. Yet a big town has sprung up, and a special railway 40 miles long connects it with the ordinary line.

**Iron.**—Iron is one of the most useful of metals. To make the best steel, impurities of sulphur and phosphorus usually found in iron ore must be extracted. By mixing the iron ore with *manganese* the bad effects of sulphur can be avoided; but to extract nearly all the phosphorus from the iron, *the 'Bessemer' process* is used. This process needs a very high temperature—upto about 1600°C. Fuel is, therefore, of great importance in the Iron industry.

**Coal.**—Coal, as you have learnt, is always found in sedimentary rocks, and so in less mountainous countries than most metals. Coal is used as a fuel for factories in a large number of industries, and it is often best to build the factories near the supply of coal. For this reason most coalfields become thickly populated manufacturing areas. Countries like Britain, India, Belgium, Germany, U.S.A. and Canada havs iron in proximity to coalfields and can make steel very cheaply. Nevertheless, countries like Sweden, Spain and

Italy (Elba) have no coal and so the best supplies of iron found in those countries have to be exported.

**Tungsten, Nickel, Manganese, Chromium and Vanadium** are mineral products used in manufacture of hard steel.

**Tin,** used in the manufacture of tin-plate, is found in the Malay States, Straits Settlements, the Dutch East Indies and Bolivia.

**Zinc** is used for the coating of steel sheets, to prevent rusting. Its oxide is used in paints. Zinc supplies come mainly from U.S.A., Germany and Australia.

**Lead** is used for roofing, water pipes and dyeing and printing cotton. Mixed with antimony it is used to produce type-metal in printing. Silver is found associated with lead and so lead mining is profitable work. The chief sources of lead are U.S.A., Spain, Germany, Mexico, New South Wales, Canada, Burma and Great Britain.

**Aluminium** is a very light durable metal. It oxidizes very slowly. It is, therefore, used in the construction of surgical instruments, torpedo-boats, air-ships, submarines, etc. Aluminium is chiefly obtained from Bauxite. Electricity is used for the extraction of aluminium from bauxite. The aluminium industry is, therefore, associated with hydro-electric development. The chief countries producing Aluminium are—U.S A., France, Germany and Italy.

**Asbestos** is useful because of its resistance to fire. Asbestos producing countries are—Canada, the Transvaal, Russia and Italy.

**Gold** is obtained from the Transvaal, the U.S.A., Canada, Mexico, Rhodesia, India, Australia, the Gold Coast and Russia.

**Silver** is obtained from U.S.A., Mexico, Australia, Canada, Peru, Bolivia, Germany, Spain, India and Japan.

**Oil.**—Oil is found in young soft sedimentary rocks, and so usually in low lands and in very many parts of the world.

Oil is obtained by drilling holes in the ground, and the oil either rushes up or is pumped up. The oil when obtained can be pumped through pipes for great distances, and so easily taken to places where it is required. Many pipe lines from oilfields are hundreds of miles long. Much oil is burnt by ships, and so it is pumped to some port where it can be used directly by oil-burning steamers. Some oilfields are in busy industrial centres, but others are situated far away in the deserts. Petrol and lubricating oils are necessary for the air service. Kerosene is required for the industries of the country. Mobility in warfare is dependent on supplies of oil. The principal oil bearing countries of the world are U.S.A., Mexico, Russia, Dutch East Indies, Persia, Burma and Rumania.

**Stone.**—Stone for building, limestone for making lime and cement, some coals and many iron ores are obtained by quarrying and not by mining. The difference is that in quarry we cut away the surface of the earth and so make a large hole (quarry); in mining a long tunnel or a deep shaft is made before we reach the coal or metal we require which may be buried deep down. Salt, too, is often quarried, and in some countries (Chili) salts called nitrates are obtained from the surface of the deserts.

**Manufacturing.**—In the old days nearly all articles were made slowly by hand, and it required a very large number of people to make only a few things. Cloth, silk, pottery, and metal articles were all made in small quantities by hand. But a great change has taken place in the world during the past century. The change is so great that it is often referred to as the "Industrial Revolution." In India we find industrial occupations are carried on in two different ways:

(1) At certain large centres, such as around Bombay and Calcutta, goods are manufactured by machinery in big factories and large quantities are produced.

Germany buy food but sell manufactures. In India—a country mainly agricultural—we sell food and raw material (such as cotton and jute), but buy manufactures which we cannot yet make ourselves. The goods sold by a country are called its exports; the goods purchased by a country are called its imports. The buying and selling and all that is connected therewith are Commerce.

## TRANSPORT

We cannot buy and sell goods without carrying them from one place to another. Even in the bazaar all the things have to be taken there before they can be sold and brought away. In a large country goods have to be brought from one part of the country to another. In the commerce between different countries the goods have to be brought from one country to the other. This carrying of goods is called transport, and the lines of transport are called the communications.

**Transport by land.**—By far the most important means of transport in civilised countries is by railway. In some flat countries rivers and canals are much used, and transport on roads by motors may be important for short distances. In countries like India, where railways and roads by no means reach every part, many of the old methods of transport still prevail. These methods vary with the country. In the frozen north reindeer or dogs drag sledges over the snow. In mountainous countries mules are most important; in India elephants are often used over hilly tracts with no roads. In deserts camel caravans alone can be used because the camels can go long periods without water and their broad feet do not sink into the sand. In the jungles of Africa coolies are used. Where rough tracks have been made, as over most of India, bullock carts are used, o buffalo in wetter regions. All these means of transport are slow compared with the railway, and the loads carried are small.

**Transport by Rivers and Canals.**—Goods can be carried very cheaply by water. In many cases only the original cost of the boat and the wages of the boatmen have to be considered, for the boat itself can be carried along by the wind. When steamers are used we must remember that one ton of coal burnt on a steamer will drag a load nearly twenty times as heavy as a train on land burning the same amount of coal. On some canals in Europe horses walk along the bank and pull a heavy boat. In this country three or four coolies do the same thing. They are able to pull a boat with a load weighing 40 tons, but on land they would only be able to pull a cart containing two tons. So transport by water is cheap, but it is slow. If we have rivers going in the direction required, river transport is most important (as it is on the Irrawardy and used to be on the Ganges). We can only use rivers which have no rapids, waterfalls, or dangerous currents. If, on the other hand, it is necessary to cut canals, that is very expensive, and ships passing through must pay "dues." Canals are very useful to join one river system to another.

**Transport by Railway.**—Railways have many advantages. They carry goods very quickly, and they can be constructed in almost any direction—except in very mountainous countries where the cost becomes very great. Transport by railway is more expensive than by water, because it costs a great deal to build the railway, and the engines, trucks, etc., are all expensive. Then railways burn much coal and many men have to be employed to look after them.

Railways in India are of different sizes, and we measure their size by the distance between the two rails which we call the "gauge." In India we have two important gauges:

(1) The broad gauge—when the two rails are 5 feet 6 inches apart.

(2) The metre gauge—when the rails are 1 metre or 3 feet 3½ inches apart.

Broad-gauge trains are much larger, can travel much more rapidly, and carry more goods, but they are expensive to build and cannot negotiate sharp curves. Metre-gauge trains are smaller and slower, but are much more useful in mountainous countries, as they can be taken round quite sharp corners and curves.

In other parts of the world, such as most of Europe and North America, the Standard gauge is used, where the rails are 4 feet 8½ inches apart. This is perhaps the best for all purposes. The biggest and fastest trains in the world, travelling at an average of more than 60 miles an hour, run on this gauge.

**Transport by Sea.**—Commerce between countries is carried largely by means of steamers. You may think that ships can go anywhere on the ocean. So they can, except where the water is very shallow. But we find that most ships follow the same route, which we call "ocean high-way" and "ocean trade routes." In other parts of the ocean it is often a very rare sight to see a steamer at all. Why should steamers usually use definite routes in this way? It is because the ocean trade routes are well known, there are good maps, and no fear of the ship striking against small islands or rocks which have not been discovered before. Dangerous places are carefully marked by lighthouses and lightships. At intervals there are "coaling stations," where ships may obtain coal and oil and other things they may require. If a ship is damaged there will be

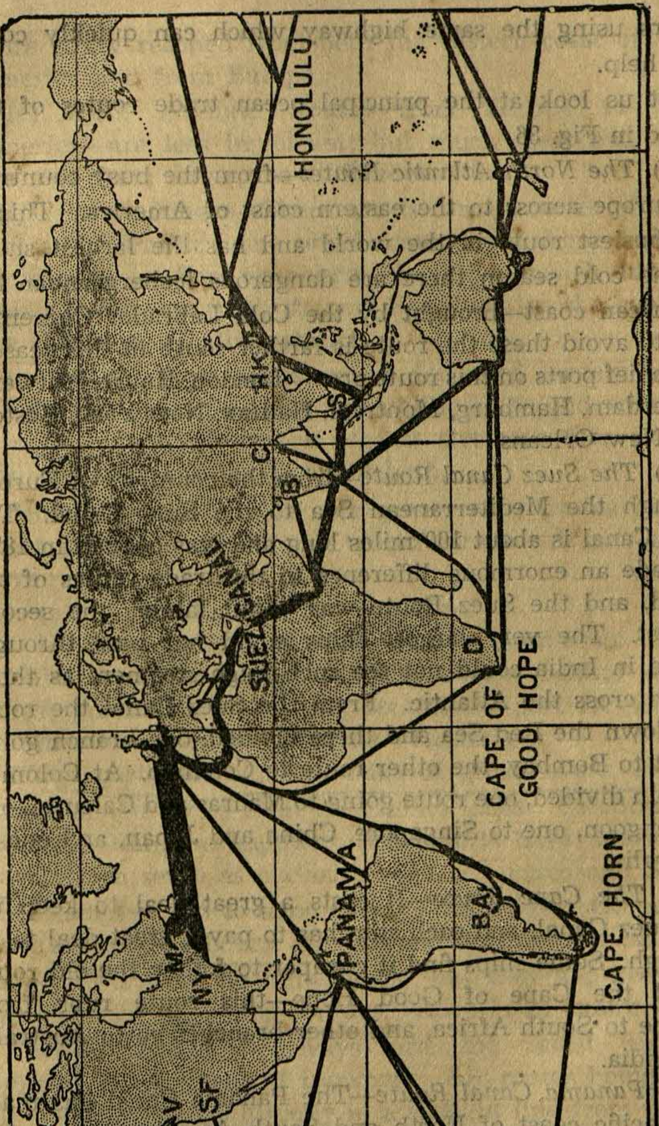


FIG. 86.—Ocean trade routes.

others using the same highway which can quickly come and help.

Let us look at the principal ocean trade routes of the world in Fig. 86.

(a) *The North Atlantic Routes*—from the busy countries of Europe across to the eastern coast of America. This is the busiest route in the world and has the largest ships. In the cold season there are dangerous icebergs near the American coast—brought by the Cold Labrador Current—and to avoid these the route is farther south in this season. The chief ports on this route are :—London, Havre, Antwerp, Rotterdam, Hamburg, Montreal, Halifax, New York, Boston, and New Orleans.

(b) *The Suez Canal Route*—from the countries of Europe through the Mediterranean Sea to the Suez Canal. The Suez Canal is about 100 miles long and was opened in 1870. It made an enormous difference to the trade routes of the world, and the Suez Route was, until lately, the second busiest. The very largest ships could not pass through, so we in India could not see such huge steamers as those which cross the Atlantic. From the Suez Canal the route ran down the Red Sea and there divided, one branch going direct to Bombay, the other route to Colombo. At Colombo it again divided, one route going to Madras and Calcutta, one to Rangoon, one to Singapore, China and Japan, and one to Australia.

(c) *The Cape Route*—It costs a great deal to keep up the Suez Canal, and each ship has to pay a great deal to go through. Some ships find it cheaper to follow the old route round the Cape of Good Hope—this route runs from Europe to South Africa, and other branches go to Australia and India.

(d) *Panama Canal Route*—The Panama Canal has made the Pacific coast of North and South America very much more easily reached from both the eastern coast of North America and from Europe.

(*e*) *South Atlantic Routes*—from Europe to South America—are less important; but much meat and wheat are sent from Argentina to Europe.

(*f*) *Pacific Routes*—There are two main series of routes across the Pacific: one which goes direct from Japan to Vancouver or San Francisco; the other which uses the island of Hawaii (with its port Honolulu) in the centre of the Pacific as a calling station.

In the old days ocean routes depended largely on the winds, but there are now few sailing ships and winds are less important. Even the biggest steamers fear icebergs and cyclones, and try to avoid both.

**Ports.**—At the ends of the great trade routes are the great ports—centres of the world's trade. A port should have:

(*a*) A good harbour for the ships.

(*b*) Good communication with a fertile or thickly populated region behind it. The region behind a port, whose products are naturally sent to the port for despatch to other countries, is called its "Hinterland."

Many ports are at the mouth of great rivers, and the basins of the rivers form their hinterlands. Calcutta is an example, Rangoon another. Some ports have fine natural bays which serve as harbours. San Francisco and Sydney are examples, and to some extent Bombay too. Other ports have artificial harbours. Madras and Colombo are examples. Some ports have no hinterlands, but they are needed as ports of coal or coaling-stations. Aden is an example.

**Transport by Air.**—Airways are the latest and the swiftest of all means of transport. Air routes being above all obstacles can go directly in a straight line from point to point. At present they are mainly used to carry mails and

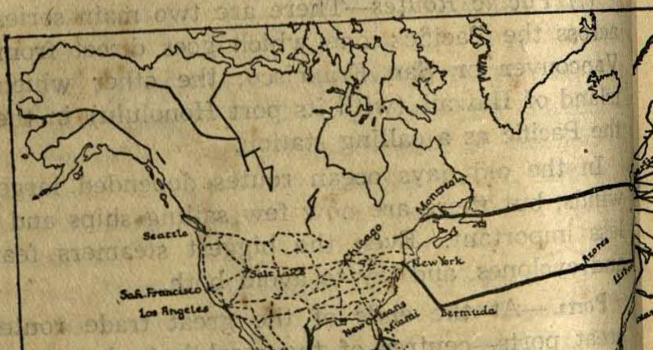
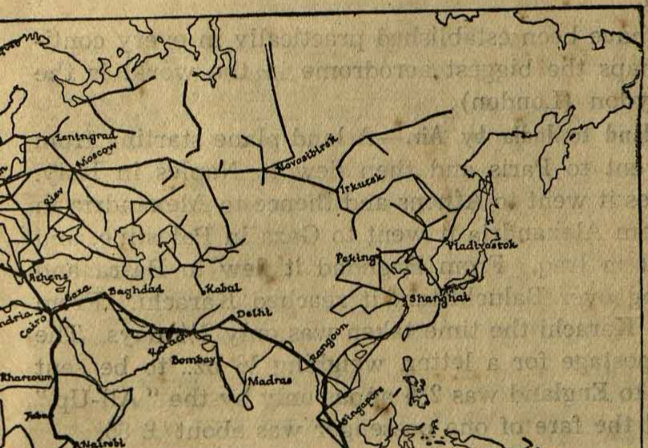

Seattle
San Francisco
Los Angeles
Salt Lake
Chicago
Montreal
New York
Azores
Lisbon
Bermuda
New Orleans
Miami
Mexico City
Trinidad
Panama
Bogota
Manaos
Para
Natal
Zeppelin
Lima
Rio de Janeiro
Antofagasta
Santiago
Buenos Aires
In the Old World - Imperial Airways
In the New World - Pan American-Grace Airways
U.S. Air Mail System
Other Main Routes

FIG. 87.—A


Leningrad
Moscow
Kiev
Novosibirsk
Irkutsk
Vladivostok
Peking
Shanghai
Athens
Gaza
Baghdad
Kabul
Delhi
ndria
Cairo
Karachi
Bombay
Rangoon
Madras
Kharroum
Juba
Singapore
Nairobi
Batavia
Darwin
Salisbury
Bulawayo
Johannesburg
berley
Brisbane
Perth
Sydney

f the World.

passengers. So far as goods traffic is concerned, only luxuries can afford carriage by air. Hence the volume of air traffic will not be important for some time to come. Cold, clouds and high mountains present difficulties to airways. Great changes in the atmosphere, too, may affect them.

Airways have been established practically in every continent. Perhaps the biggest aerodrome in the world is the one at Croydon (London).

**From England to India by Air.**—A land plane starting from Croydon went to Paris and then flew to Naples in Italy. From Naples it went to Athens and thence to Alexandria in Egypt. From Alexandria it went to Gaza in Palestine, and to Baghdad in Iraq. From Baghdad it flew to Basra and then passing over Baluchistan, it reached Karachi. From Croydon to Karachi the time taken was only 2½ days. The minimum postage for a letter, weighing ½ oz., to be sent from India to England was 2½ annas only by the "All-Up" service and the fare of one passenger was about £ 85.

The stoppages on the International England—India—Australia Air Mail Service are: London—Marseilles—Rome—Brindisi—Athens—Alexandria—Baghdad—Basra—Bahrin—Karachi—Gwalior—Allahabad—Calcutta—Akyab—Rangoon—Bangkok—Penang—Singapore—Batavia—Sourabaya—Darwin. This service was by flying-boats.

The great centres of the airways in Europe are London, Paris and Berlin. You have seen how one route goes from Croydon to Karachi. From Athens another route goes to Cairo, Khartoum, Nairobi, Johannesburg, Kimberley and Cape Town. This is known as the Cape to Cairo Route. Paris and Berlin link up the big cities of Europe.

In America there are important routes. One joins New York, Chicago, San Francisco. Another connects New York with Miami in Florida, while the third connects Miami with Buenos Aires in Argentina. In Australia, airways have proved very useful. Perth is a centre and is connected with Brisbane and Sydney.

India has now about forty internal air services which connect most of the important towns and cities by air.

### QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches, etc.

1. Name the principal industrial countries of the world, and explain the causes of their industrial greatness. (B. U. 1929)

2. Mention the principal factors that affect the industrial development of countries. Illustrate the working of these factors in the case of India. (B. U. 1931)

3. Describe the different methods in use for transporting commodities from one country to another and compare the advantages and disadvantages of these methods. (B. U. 1930)

4. Write a note on the London—Karachi Air Route. (B. U.)

5. Distinguish between a port and a harbour. What are natural and artificial harbours? Give two examples of each. (B. U. 1926)

6. Mention the different routes by which you can travel from Bombay to New York. Describe your journey by any one of these routes. (B. U.)

7. A traveller from Adelaide wants to go to England. By what different routes can he make that journey? Which route should he choose if he wants to reach England in the shortest time? (A.V.M.S., Bur. 1924)

# PART II. INDIA

## CHAPTER XVII

## COAST-LINE AND PHYSICAL FEATURES

India is one of the most fertile and most thickly populated countries in the world; her people are advanced among the races living in the Tropics, and have a history of greatness going back for thousands of years. It is during the last hundred years that the modern Indian nation has sprung up. India is naturally shut in and defended by a great wall of mountains. There are two parts which lie outside the wall. They are the dry lands of Baluchistan and the cold uninhabited plateau of northern Kashmir. There are two areas lying inside the wall which do *not* form part of India—the independent State of Nepal and the island of Ceylon. Burma has been separated from India, politically, since 1937.

### POSITION AND SIZE

India lies entirely to the north of the equator. The southernmost point of the mainland, Cape Comorin, is in latitude 8°N. The Tropic of Cancer passes right through India, cutting the country roughly into two halves. The northern frontier of India reaches 37°N. Although roughly half of India lies outside the Tropics, in the Temperate Zone, we always think of India as a tropical country. We can do this because it is well marked off from the rest of Asia by its mountain wall. The climate presents great contrasts, ranging from the tropical monsoon type in Malabar to the cool temperate type in the Punjab, and from the hot desert type in Rajputana to the wet tropical type in Assam. India stretches from longitude 61°E to 97°E—that is, one-tenth of the way round the globe. Longitude 70°E. passes through the Indus Valley, and 90° through the Delta of the Ganges. We have already learnt by comparing the size of India with the continent that it is a very large country—2,300 miles from east to west, 2,000 miles from north to south. Its area is 1,575,107 square miles. Notice the countries which border India—Persia and Afghanistan on the west, Russian Turkistan and Tibet on the north, China, French Indo-China and Siam on the east. India has 6,000 miles of land frontier and 5,000 miles of sea frontier. Notice her favourable position for sea trade—with Europe *via* the Suez Canal; with Africa; with the Far East *via*

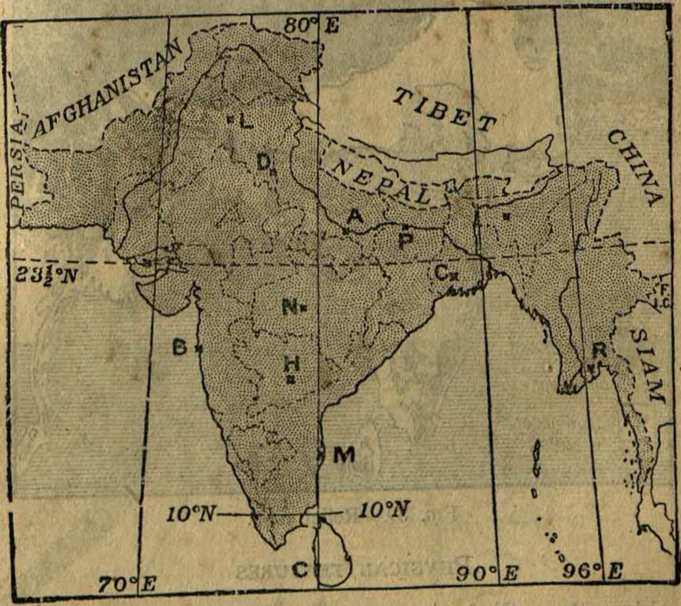


FIG. 88.—The position of India and Burma.

Singapore; and with Australia. India takes its standard time from the meridian of 82° 30′ which is 5½ hours ahead of Greenwich time. Burma has its own standard time.

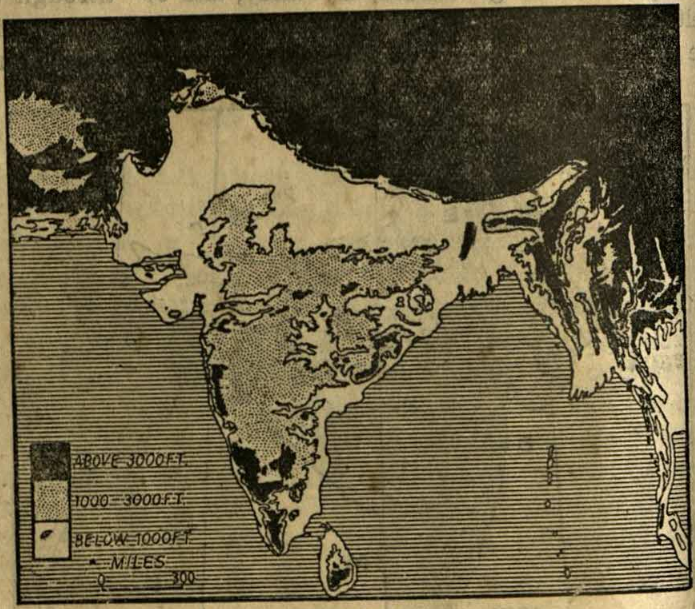


Fig. 89.—Relief map.

## Physical features

Looking at a relief map of India, we see that the country is formed of three main parts:

(1) The mountain wall.

(2) The great plain of Hindustan, formed by the valleys of three great rivers, the Indus, Ganges, and Brahmaputra.

(3) The plateau of Peninsular India.

**The Coast-line.**—Compared with the size of the country the coast-line of India is short, for there are few bays or gulfs. Places in the heart of India, like Delhi and Nagpur,

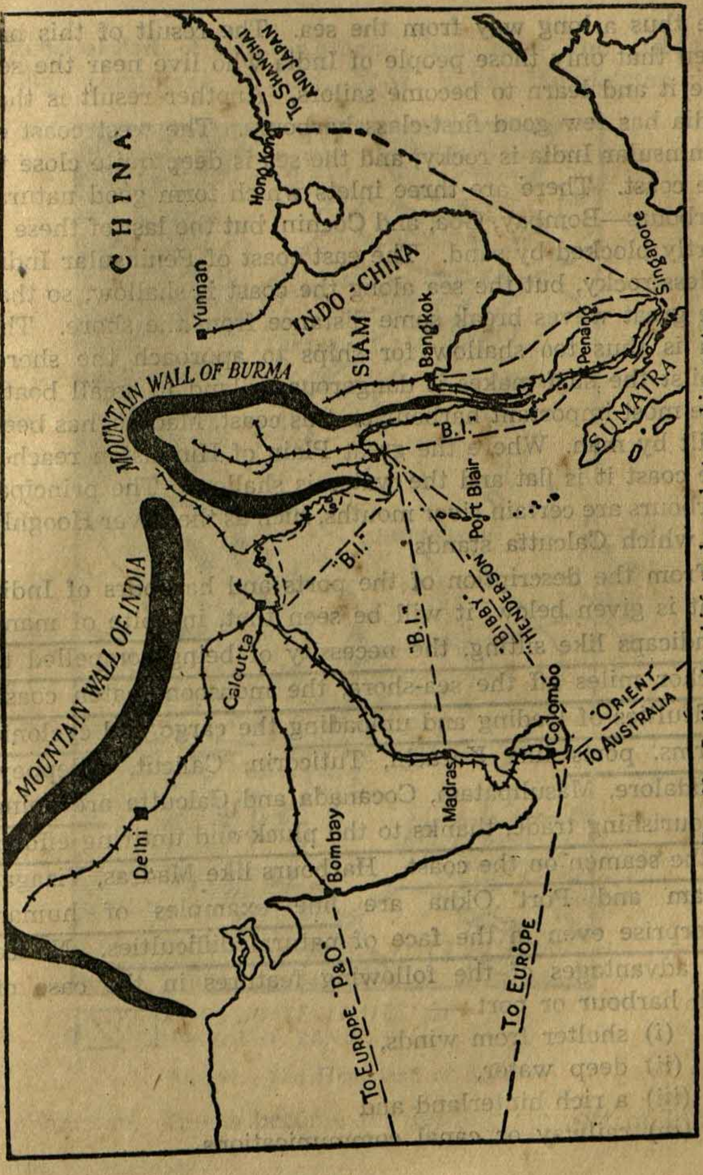


FIG. 90.—India, the chief trade and steamship routes.

are thus a long way from the sea. The result of this has been that only those people of India who live near the sea like it and learn to become sailors. Another result is that India has few good first-class harbours. The west coast of Peninsular India is rocky, and the sea is deep quite close to the coast. There are three inlets which form good natural harbours—Bombay, Goa, and Cochin; but the last of these is partly blocked by sand. The east coast of Peninsular India is less rocky, but the sea along the coast is shallow, so that the great waves break some distance from the shore. The sea is thus too shallow for ships to approach the shore, whilst the surf makes it dangerous to land in small boats. The most important harbour on this coast, Madras, has been built by man. Where the great Plain of Hindustan reaches the coast it is flat and the water is shallow. The principal harbours are certain river mouths, such as the River Hooghly on which Calcutta stands.

From the description of the ports and harbours of India that is given below, it will be seen that, in spite of many handicaps like silting, the necessity of being compelled to anchor miles off the sea-shore, the monsoon-beaten coast, difficulties of loading and unloading the cargo and cyclonic storms, ports like Karachi, Tuticorin, Calicut, Alleppey, Cuddalore, Masulipatam, Cocanada and Calcutta are doing a flourishing trade, thanks to the pluck and untiring efforts of the seamen on the coast. Harbours like Madras, Vizagapatam and Port Okha are fine examples of human enterprise even in the face of natural difficulties. Notice the advantages of the following features in the case of each harbour or port :—

(*i*) shelter from winds,
(*ii*) deep water,
(*iii*) a rich hinterland and
(*iv*) railway or canal communications.

**Principal Ports of India.**—*Karachi*[1] has been the gate of foreign commerce of Sind, N.-W. India, Baluchistan and

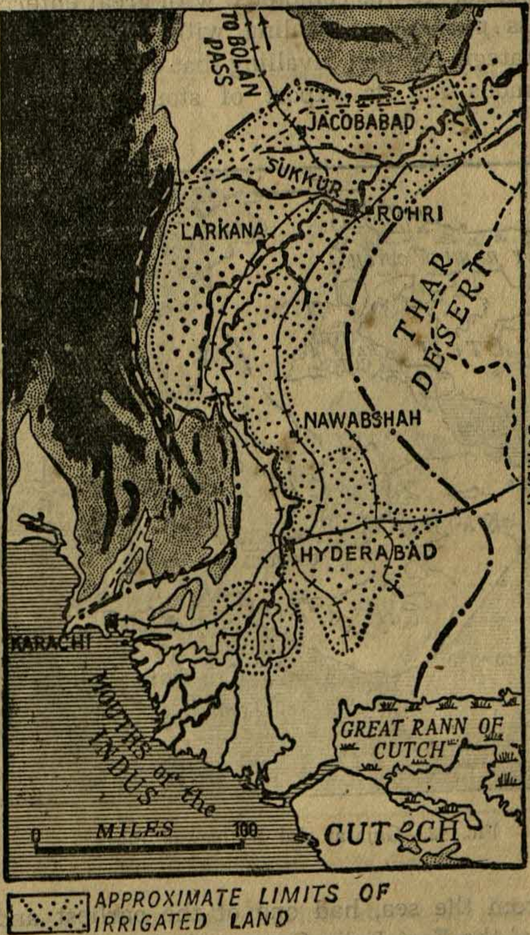


FIG. 91.—The Hinterland of Karachi.

Afghanistan. It has become the leading air port of India.

[1] Now in Pakistan.

*Bedi Bunder*, "the Liverpool of Kathiawar," is the principal port of the Nawanagar State. *Port Okha* belongs to the State of Baroda. It was completed with great enterprise for the express purpose of dealing with ocean-going traffic. It has a strategic position, rivalling that of Bombay. *Porbandar* is famous for its export of stone. *Surat*, situated 14 miles from the sea, had one of the earliest and mos important of the East India Company's factories. Its trad is now transferred to Bombay. *Mormugao* is a po which is open even during the monsoons. In its hinterlan lie the regions of Bombay-Deccan, Hyderabad and Mysor

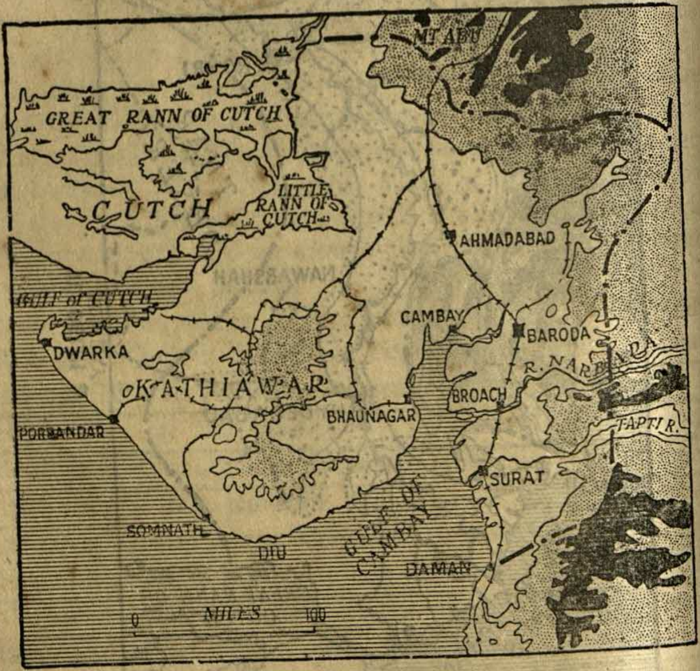


FIG. 92.—Gujarat and Kathiawar Ports.

*Bombay* was part of the dowry of Catharine of Braganza, Queen of Charles II, who conferred it for an annual rent of £10 upon the East India Company in 1668. In 1838 a regular monthly service to England by the overland route was established. In 1850 Bombay was linked up by railway

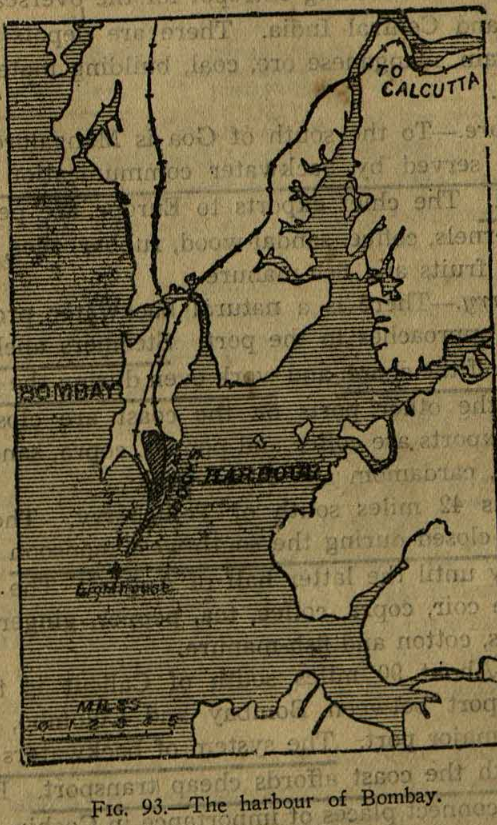


FIG. 93.—The harbour of Bombay.

with the cotton-growing districts above the Ghats and the wheat-fields of the Punjab and the United Provinces. During the American Civil War Bombay cotton had a great demand from Liverpool mills, and Bombay came to be styled as the *Cotton Port* of India. The port of Bombay owes its importance to its geographical position and to its magnificent deep water harbour. Its central position and accessibility by sea and land have made Bombay the main gateway and distributing entrepot for the overseas trade of Western and Central India. There are depots for petrol cotton, grain, manganese ore, coal, building materials, hay, straw, etc.

*Mangalore.*—To the south of Goa is Mangalore. It is a tidal port served by backwater communication with the hinterland. The chief exports to Europe are pepper, tea, cashew kernels, coffee, sandal-wood, rubber, tiles, rice, salt-fish, dried fruits and fish-manure.

*Tellicherry.*—There is a natural backwater provided by the rocky approaches to the port. Steamers anchor about two miles off the shore, and work even during the monsoons when all the other ports on the coast are closed. The principal exports are coffee and pepper, copra, sandal-wood, tea, ginger, cardamom and rose-wood.

*Calicut* is 42 miles south of Tellicherry. The port is practically closed during the south-west monsoon from the end of May until the latter half of August. The principal exports are coir, copra, coffee, tea, pepper, ginger, rubber, ground-nuts, cotton and fish-manure.

*Cochin.*—About 90 miles south of Calicut is the most important port between Bombay and Colombo, recently declared a major port. The system of backwaters running parallel with the coast affords cheap transport. Excellent waterways connect places of importance in Cochin and Travancore States. An agreement has been entered into by the British Government with Cochin and Travancore Durbars under which the three Governments jointly finance the development of the harbour. Ernaculam has been linked with the Podanur—Mangalore broad-gauge section of the South Indian Railway, so as to give unhindered access to the fertile hinterland. The exports from Cochin are coir, yarn, coir mats, lemon-grass oil, cashew kernels, copra, coconut oil, tea, rubber and ground-nuts.

*Alleppey* is the premier port and commercial centre of the Travancore State. A canal connects the port with the interior backwaters. It possesses a roadstead affording safe anchorage during the great part of the year. A mud bank in the roadstead acts as a natural breakwater against the force of the roughest seas. The chief exports are copra, coconuts, coir fibre and matting, cardamoms, ginger and pepper.

*Quilon* has been a trading centre from very early times. Vessels anchor at about ¾ mile from the shore and a railway siding runs up to the landing place. The exports are coconut oil, coir mats, timber and fish.

*Tuticorin* is in the Madras Province, and can be reached after rounding Cape Comorin. This port is open all the year round. The harbour is so shallow that steamers anchor about 5 miles from the shore and continuous dredging is necessary to keep the channel open between the shore and the roadstead. A scheme for the construction of a deep water harbour has been held in abeyance for want of finance. There is a considerable trade here in rice, pulses, onions, chillies and livestock, raw cotton, tea, senna leaves, palmyra fibre and cardamoms.

*Dhanushkodi* is the terminus of the South Indian Railway on the island of Rameshwaram and is connected with Talaimannar in Ceylon 21 miles distant by a steamer service. The port is equipped with one pier. The chief exports are fish, rice, cotton piece-goods and tea.

*Negapatam* is the chief port in the Tanjore District. It is connected with Nagore, the eastern terminus of the South

Indian Railway. The port is connected by river and canal with the tobacco growing areas in the south. The European Mail for the Straits of Settlements is railed from Bombay to

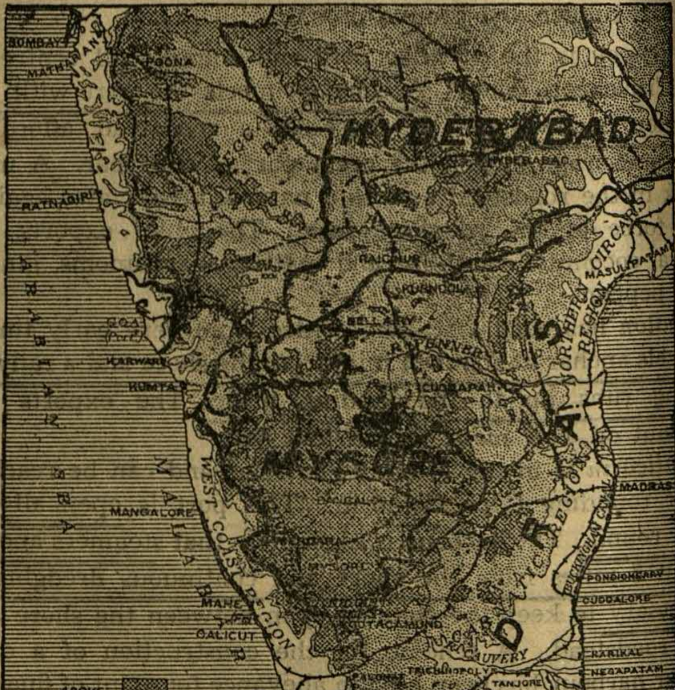


FIG. 94.—Ports of Southern India.

Negapatam and thence taken to Penang and Singapore by a connecting steamer. The principal exports are ground-nuts for Europe, coloured cotton piece-goods, tobacco and fresh vegetables for Penang, Singapore, and Colombo. Coolies are constantly leaving by this route to work on the rubber and tea estates in Ceylon and the Federated Malay States.

*Karikal* is an open roadstead on the French Settlement of Karikal. There is a considerable rice traffic by country boat with Ceylon and the Straits Settlements. The Standard Oil Company has a large installation at Karikal, which is a free port. The exports are rice, betel-nuts, and kerosene oil.

*Cuddalore* is situated about 15 miles south of Pondicherry. It is on the main line of the South Indian Railway. Steamers anchor about a mile off-shore. There is a quay wall which facilitates the loading and unloading of cargo boats therefrom. The export trade consists of ground-nut kernels and coloured piece-goods.

*Pondicherry* is the capital of the French Settlements in India. A pier 300 yards long fitted with electric elevators facilitates the landing and shipment of goods. Steamers anchor within two or three hundred yards of the pier, and loading and unloading is done in country boats. Pondicherry is the centre of the export trade in ground-nuts. The other exports are ghee, unbleached cloth, onions, bonemeal and mangoes.

*Madras.*—This is an artificial harbour formed by two concrete walls projecting into the sea. They enclose a space of about 200 acres, within which 14 vessels drawing up to 31′-6″ can be accommodated. Vessels can enter and leave the harbour at any time of the day. The principal exports are ground-nuts, skins and hides, onions, tobacco, raw-cotton, oil cakes, turmeric, manures and coffee.

*Masulipatam.*—It is the principal port in the delta of the Kistna river. It is connected by railway lines with Madras, Calcutta and Bezwada. The port has many disadvantages. Large vessels cannot anchor within five miles from the port. In foul weather communications between ship and shore is practically suspended. The exports are ground-nuts, castor oil and oil cake.

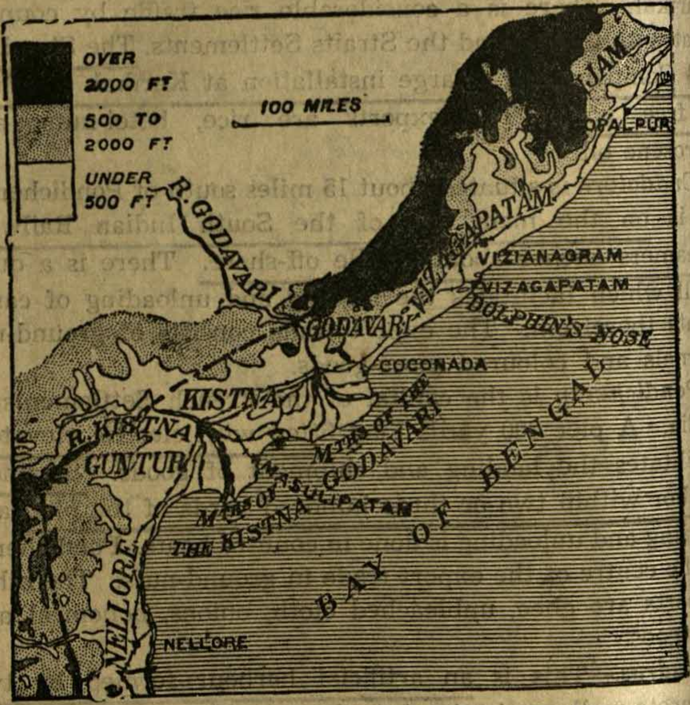


FIG. 95.—Ports of the Northern Circars Region.

*Cocanada* is situated on the Cocanada bay just north of the Godavari river. Large steamers anchor about 6 or 7 miles from the shore. Service is maintained with lighters which land their cargoes at the wharves or jetties on the banks of the Cocanada Canal. Constant dredging is necessary. In spite of these disabilities Cocanada is the fifth port of importance in the Madras Presidency. The principal exports are raw cotton, ground-nuts, castor seeds, rice and paddy.

*Vizagapatam* is a major port with great possibilities. It is situated about 105 miles north of Cocanada and 545 miles south of Calcutta. Two miles from the port is Waltair, the junction of the Madras and Southern Mahratta with the Bengal-Nagpur Railway. A harbour has been constructed and worked as part of the Bengal-Nagpur Railway undertaking. Since 1932 the Vizianagaram-Raipur line has been opened. Thus a vast area in the Central Provinces, rich in manganese, cotton and oilseeds is served by this port. The exports are manganese, myrabalans, niger and rape seeds, and oil cakes. Besides, there is a considerable cooly traffic with Rangoon. Vizagapatam is coming to the forefront since the present Second Great World War. Ship-building has just been started at Vizagapatam, which will be of great strategic importance in the Far East.

*Calcutta* is the premier city of India. The port serves the great jute, tea and coal industries, the wheat and seed traffic of Bihar, and the United Provinces and the agricultural areas tapped by the East Indian, Bengal-Nagpur and Eastern Bengal Railway. There are, in addition, many waterways connecting the delta with the interior of Bengal and Assam. There is extensive warehouse accommodation for storing tea, grain and seeds. The river Hooghly is a difficult river to navigate. Pilotage is compulsory. Vessels are discharged rapidly and efficiently. Continuous day and night, Sunday and holiday service is always forthcoming. Three suction dredgers are maintained. The principal exports are: jute, gunnies, tea, hides, oilseeds, rice, manganese ore, pig iron and coal.

*Chittagong* is at the mouth of the Karnafuli river in East

Bengal. It is the natural outlet for the trade of Assam and North-East Bengal. Jute from Chandpur and Narayanganj arrives here ready for shipment. The port is also a popular one for the shipment of tea. The other exports are wax, rice, paddy, oils, provisions, spices and tobacco.

Ceylon is the only important island lying off the coast of India, to which it is very nearly joined by a line of sand-flats and rocks called Adam's Bridge.

**The Mountain Wall.**—Remember the names which have been given to various parts of India's mountain rampart. From the Pamir Knot in the north the greatest range of all is that of the Himalayas (the "abode of snow"), with many of the highest peaks in the world: Mount Everest, 29,000 feet; Kinchinjunga, 27,815 feet; and others. Another great range, which is really a northern branch of the Himalayas, runs

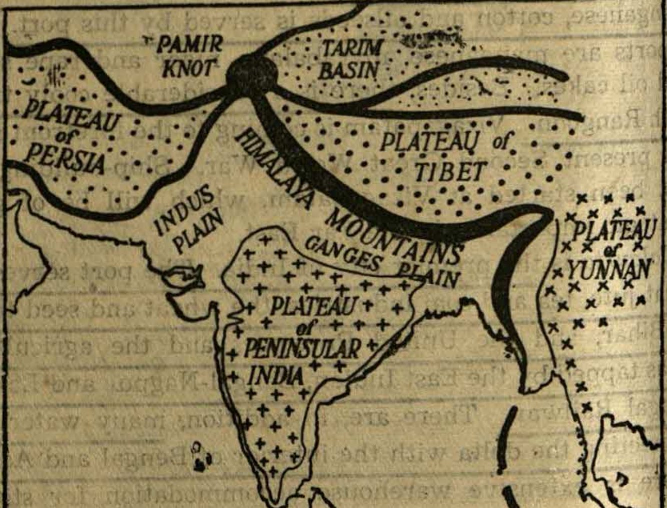


FIG. 96.—The physical regions.

eastwards from the Pamir Knot and is known as the Karakoram Range. One of its highest peaks is Mount Godwin Austin (28,250 feet). To the north of the Himalayan Range lies the plateau of Tibet, the highest in the world. Running south-westwards from the Pamir Knot and separating India proper from Afghanistan and Baluchistan, is the Sulaiman Range, passing southwards into the Khirthar Range. The mountain wall between India and Burma has received various names. In the north it is a narrow wall and is known as the Patkoi Hills; then it broadens out into the Naga Hills. In Assam we have the Jaintia, Khasi, and Garo Hills. Southwards from Manipur are the Lushai Hills, and then again a narrow wall known as the Arakan Yoma. The Arakan Yoma reaches the sea at Cape Negrais, but is continued in the Andaman and Nicobar Islands.

*Doors through the Mountain Wall of India*—There are no easy ways through the mountain rampart which surrounds India, but there are some difficult passes by which people from outside can approach India. In bygone ages India has been invaded from the north-west. The two more important doors by which the invaders came were the Bolan Pass and the Khyber Pass. Another pass is the Gomal Pass.

The following are some of the historic invasions that were undertaken through the Khyber Pass: Muhammed Ghori's invasions from A.D. 1179 to A.D. 1195; Tamerlane's in A.D. 1399; Babar's in A.D. 1527 and the British invasions of Kabul in A.D. 1839 and in A.D. 1878. The Khyber Pass leads from Peshawar to Kabul; and the Bolan Pass leads from Quetta to Kandahar.

These doors are still important. Another route is along the sea-coast of Makran. There are two difficult roads leading from the town of Srinagar in Kashmir, across the Zojila Pass and the Karakoram Pass. From Punjab to Tibet is the Shipki Pass; but for hundreds of miles there is no route across the Himalayas until Darjeeling is reached. There have been some back doors into Burma through the moun-

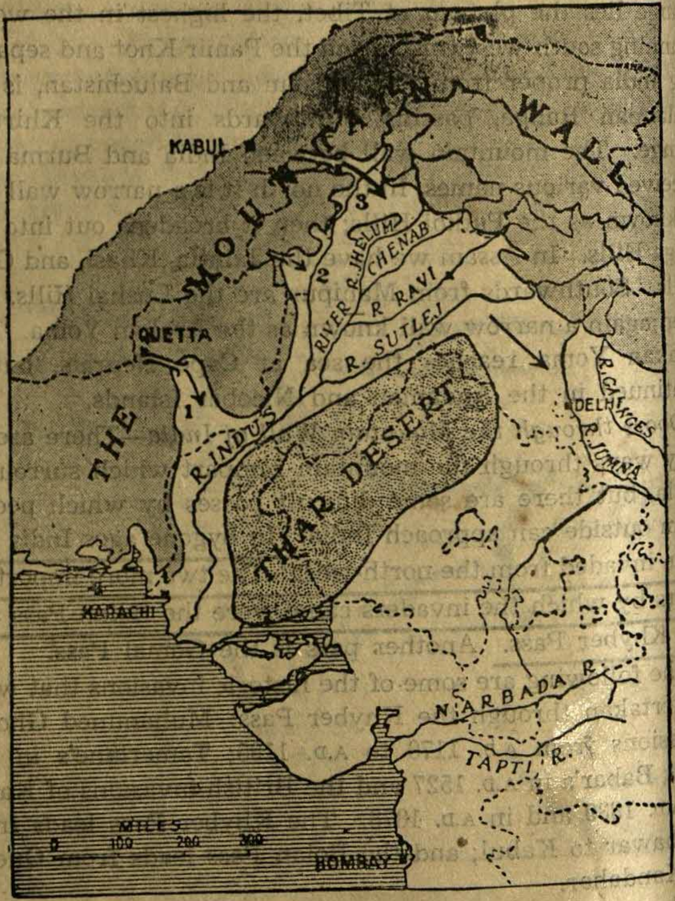


FIG. 97.—Doors of North-Western India.

1. The Bolan Pass; 2. The Gomal Pass; 3. The Khyber Pass; 4. The Makran Coast route.

The large arrow indicates the route by which invaders had to p
Delhi on their way to the east and south of India.

tain wall which separates India from Burma. They are very little used, and nearly every one goes to Burma by sea—from Calcutta or Madras to Rangoon. There are also routes from China to Burma. The most important is through Bhamo. Across the mountains between India and Burma there are four main routes—the Tuzu Gap, the Manipur Route, the An Taungup Passes. From Burma into China are numbers of routes, of which the most important is the Taping Valley Route.

**The Plain of Hindustan.**—Inside the mountain wall lies one of the most important plains in the world. It occupies the greater part of Northern India, and is more than 2,000 miles from end to end, and usually from 150 to 200 miles broad. This great plain is formed by the basins of three rivers and their tributaries. In the west and draining into the Arabian Sea is the River Indus. Farther east is the River Ganges, which flows south-eastwards into the Bay of Bengal. The city of Delhi, the proud capital of India, stands nearly on the water-parting between these two river basins. Before the Ganges reaches the sea it is joined by the third of the mighty rivers, the Brahmaputra. Throughout the whole of the plain of Hindustan there is not a hill to be seen. The floors of the river valleys rise so gradually that the slope cannot be seen. Nearly 100 miles from the mouth the surface of the River Ganges is only 500 feet above sea-level. The Ganges Valley gets much rainfall, particularly towards the east, but the Indus valley is much drier. Large-scale irrigation helps to raise many important crops, chief of which is Egyptian cotton.

**The Plateau.**—Nearly the whole of India south of the great plain of Hindustan is occupied by a plateau. The western side is the higher, and the surface slopes down towards the east. The western edge of the tableland stands high above the surface of the sea and is known as the

On the other hand, the rivers of Peninsular India—

(*a*) Do not yield a constant supply of water.

(*b*) Their valleys are less suitable for irrigation.

(*c*) Are not navigable for long periods of the year.

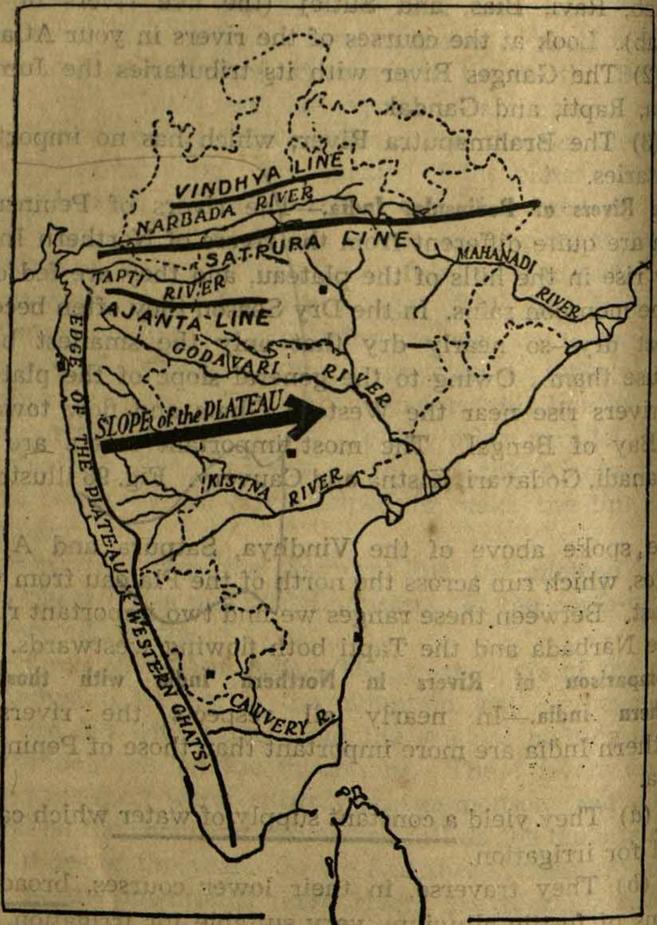


FIG. 98.—The rivers of Peninsular India.

Notice also that the rivers of Northern India have a long upper course in the mountains; the rivers of Peninsular India have not.

**Floods of Indian Rivers.**—Towns situated on the banks of Indian rivers are yearly in danger of floods. The Shyok, the tributary of the Indus, is in floods on account of the melting of the snows on the Himalayas, and, sometimes, endangers the safety of the Punjab by overflowing its tanks. The Sukkur Barrage is also affected adversely by these floods which may occur sometimes from April to July. Bhagirathi, the tributary of the Ganges, the second river of India, is in flood twice a year. After the first rush in the period between June to August, the floods subside in the latter part of August. Then, in September, comes on the rush of waters for a second time; and this lasts till October. The houses situated on the elevated part of the marshes of the Sundarbans look like innumerable islands, being surrounded by water. The rise in the level of the water, due to floods, attain a height of 14-15 feet near Dacca. Instances of the devastation caused by the floods of the Brahmaputra are not uncommon. These floods occur in May or June. In October, when these floods subside, rice is grown on the banks. The Mahanadi, which pours its waters into the Bay of Bengal, rises to such an extent during the rainy season that Lake Chilka gets swollen with the waters it receives from the tributaries of the river. The water rise to a height of 15-20 feet, with the result that marshes are formed, and the people living near the mouth of the river suffer from fever. From January to June the waters subside, making bare a bed which is partially swampy and partly dry.

From July to September, rivers on the Deccan Plateau like the Kistna and the Godavari are also high in flood. Freshets from the surrounding country rush into the Colair Lake. The length of this lake in the dry season is 24 miles;

however, in the rainy season it is increased by 16 to 2 miles. The South-West Monsoon raises the waters of the Cauvery in July or August. These subside before the North-East Monsoon sets in. Later, in January, the water of the river is so low as to enable a person to cross the river on foot. The Tapti and the Narbada, which flow into the Arabian Sea, are no less dangerous in times of floods.

**The Generating of Electrical Power.**—Owing to the convenience of employing machinery in preference to human labour, even modest factories make use of machinery if they can. Coal has long been used as a fuel in factories. Some plants also work on oil. Now-a-days, however, electricity is being more and more used to drive machinery in mills and factories.

Rainwater flowing down the side of the Sahyadris is employed in the generation of electricity at Khopoli, Bhivapuri and Bhira. This electrical energy is transmitted to Panvel, Bombay and its suburbs, Neral, Ambarnath, Kalyan, Bhivandi, Thana, Bhandup and other places. Electricity is also supplied from Khopoli to Poona, a distance of about 40 miles. Electric trains run from Bombay to Poona and Bombay to Nasik and back.

One of the advantages of electric power is that it can be transmitted over long distances. The principal water courses in India are being exploited for the generation of electricity, so that a number of towns get their electrical supply cheaply. The Tatas have, in view, great schemes like the "Andhra Valley Power Scheme", "The Nila-Mula Scheme" and "The Koyna Scheme". The Bombay Province is deficient in coal. This deficiency is made up by electrical power generated from water flowing down the Sahyadri mountains. The mills of Gokak get their electricity from the Gokak Falls.

Electricity is contributing to the progress of cities and villages and is becoming more and more popular. It is proposed to supply electricity to the city of Delhi from the waters of the Uhl, in the Mandi State of the Punjab. The

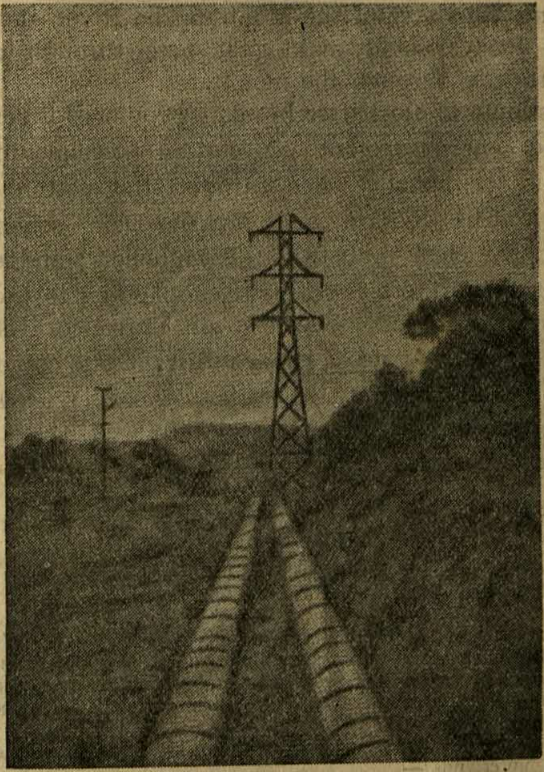


Photo: *M. G. Nene.*

FIG. 99.—Hydro-electric Development in the Sahyadris.

Kashmir State has a scheme for generating electricity from the waters of the Jhelum. The Mysore State has generated electricity by damming the Cauvery at Shivasamudram, and it is supplied to the goldfields at Kolar and to industrial centres like Bangalore and Mysore. The Madras Government has received great impetus in developing her industries from the Pykara and Mettur Dam Schemes.

The hydro-electric scheme in Travancore consists in diverting the water of the Mudirapuzha River—a tributary of the Periyar—and making it pass through a tunnel 10,255 ft. long through the mountains.

The supply of electricity in many Provinces is responsible for the encouragement of certain special industries. Khopoli, for instance, has fostered the cotton mills of Bombay. The Pykara and Mettur Dam scheme have fostered the cigar industry in Trichinopoly; and electrical schemes in Northern India have contributed to the growth of sugar and wollen industries. In Travancore electricity is used for spinning mills, paper mills, tile and coir factories. In the United Provinces, electricity is being used for the development of rural areas, where tube well irrigation is an important feature.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches, etc.

1. Show how India is certainly situated with respect to the Indian Ocean.
2. What are the ideal requirements of a good port? What Indian port satisfies all these requirements in the fullest possible manner?
3. Which of the ports of India are closed during the monsoons? Which ports suffer from cyclonic storms? Which ports have to be dredged, being often silted?
4. Describe the importance of the following ports in relation to their respective hinterlands:—

   Karachi, Bombay, Madras, Vizagapatam and Calcutta.
5. Explain how the Himalayas protect India. Mention some of the historic mountain passes on the borderland of India.
6. Compare the rivers of Northern India with those of Southern India.
7. Show how the hydro-electric schemes of Khopoli, Shivasamudram, Pykara, Travancore and the United Provinces have been designed to foster various industries.

## CHAPTER XVII

# SOILS, CLIMATE, NATURAL REGIONS AND AGRICULTURE

### SOILS AND MINERALS

The main features of the geology of India correspond very closely with the physical features. The mountain walls consist of folded sedimentary rocks. The plain of Hindustan consists almost entirely of alluvium, and so do most of the coastal strips, and of course the river deltas. In the Ganges Valley the alluvium is many hundreds of feet thick. The

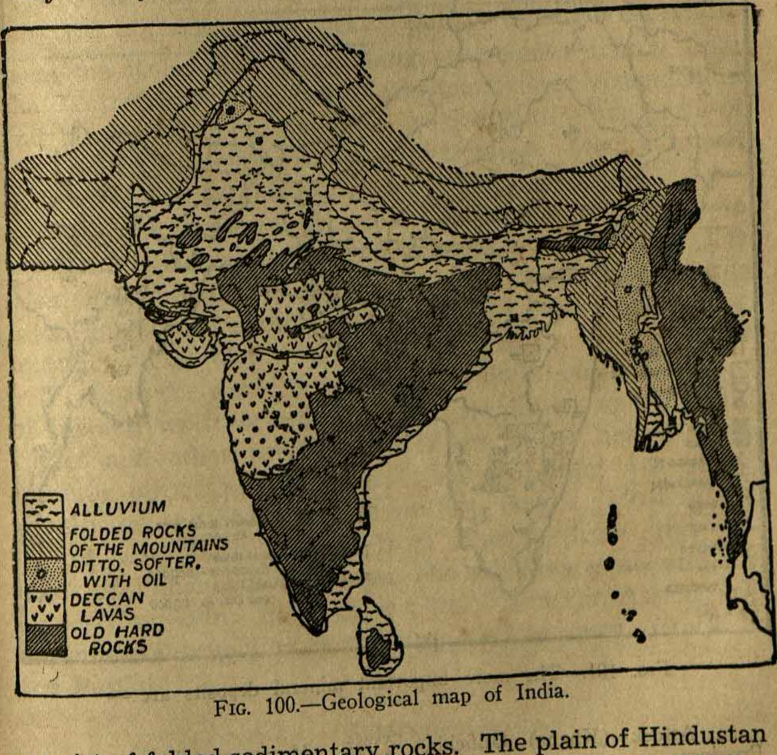


FIG. 100.—Geological map of India.

Indian Plateau consists mainly of very old crystalline rocks. This mass of old rocks was in existence long before the great Himalayan fold mountains were formed. Vide p. 56.

On the edge of the plateau are areas of sedimentary rocks,

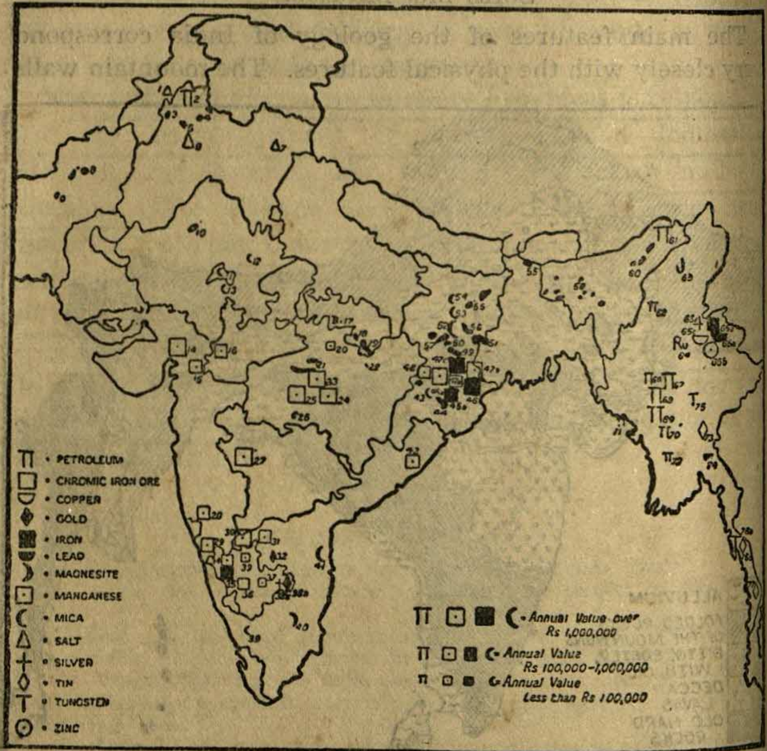

PETROLEUM
CHROMIC IRON ORE
COPPER
GOLD
IRON
LEAD
MAGNESITE
MANGANESE
MICA
SALT
SILVER
TIN
TUNGSTEN
ZINC
Annual Value over Rs 1,000,000
Annual Value Rs 100,000–1,000,000
Annual Value Less than Rs 100,000

FIG. 101.—The more important mineral deposits are:—

. Attock (Khaur) Oilfields. 23-25. Manganese deposits, Central Provinces.
38. Kolar Goldfield. 46-47. Iron fields for Tata Works.
51. Jharia Raniganj Coalfield. 61. Digboi (Assam) Oilfield.
65. Silver—Lead—Zinc—Copper Mines of Bawdwin. 68. Singu Oilfield.
69. Yenangyaung Oilfield. 76-77. Tin ore of Tavoy and Mergui.

important because they are coal-bearing. Nine-tenths of the coal of India comes from the Jharia and Raniganj fields in the north-eastern part of the plateau, but there are also coal-bearing beds in the Godavari Valley and on the northern slopes of the plateau. Nearly the whole of the north-west of the plateau has been covered by great sheets of lava—the Deccan lavas. This region is one of the largest areas of lava in the world. Many valuable minerals occur associated with the old crystalline rocks. Gold is obtained especially from the Kolar Goldfield. Manganese comes mainly from the Central Provinces, but is also found near Vizagapatam and Mysore. Copper and iron are found in other parts of the plateau, especially in Bihar and Orissa. Mica is mined in Madras and in the north-east of the plateau.

The Island of Ceylon is a detached portion of the Deccan plateau and is famous for its graphite and gem stones. The Shan Plateau of Burma, with its continuation southwards into Tenasserim, is another region of old hard rocks rich in minerals. One of the largest deposits of the ores of silver and lead in the world is found at Bawdwin; large quantities of tin and wolfram are obtained near Tavoy and Mergui; rubies and other precious stones are found near Mogok. Mineral oil or petroleum is found in young soft rocks, usually on the borders of great fold ranges. Most of the oil of the India comes from Burma—from the oil-fields of Yenangyaung, Singu, Minbu, Yenangyat, and the Upper Chindwin. Some oil is also obtained in Assam, and an important field is now being worked near Attock in the Punjab.

### CLIMATE

**Temperature.**—Take the month of January as typical. The sun is then shining vertically a long way to the south of India, and—as we should expect—it gets cooler as we travel from south to north—from an average of 80° at Colombo to

55° at Lahore, and of course even colder in the hills. This is seen in Fig. 102. In July the sun is shining directly over a large part of India, and we should expect the land to get hot. The plains of the Punjab are among the hottest regions of the world. But as the heated air over the Punjab rises and cooler winds from the sea are drawn in, the remainder of India is not as hot as it might be. The dry parts like Central India and Central Burma get very hot, and so does the Madras coast, where the wind blows from the land; but the wet regions of the West Coast and Bengal are cooler. The hilly regions, too, remain cool.

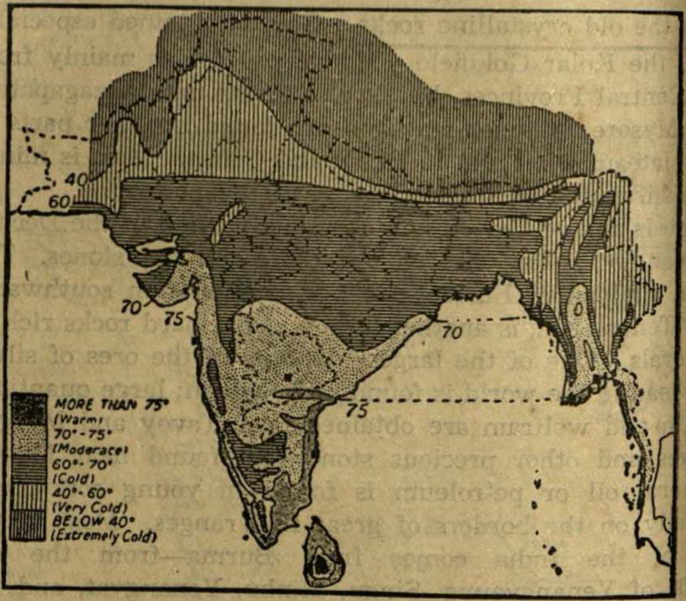


FIG. 102.—Temperature map of India for January.

Those places, therefore, which are a long way from the sea, especially in the dry regions, have hot days and cold nights and there is a big daily range of temperature. While, for example, it is 32° at Lahore, it is only 3° in Bombay. Similarly, dry regions a long way from the sea have a big annual range of temperature. The difference between the hottest and coldest months at Lahore is 39°, while in the case of rainy Trivandrum in Travancore, the annual range is only 5°.

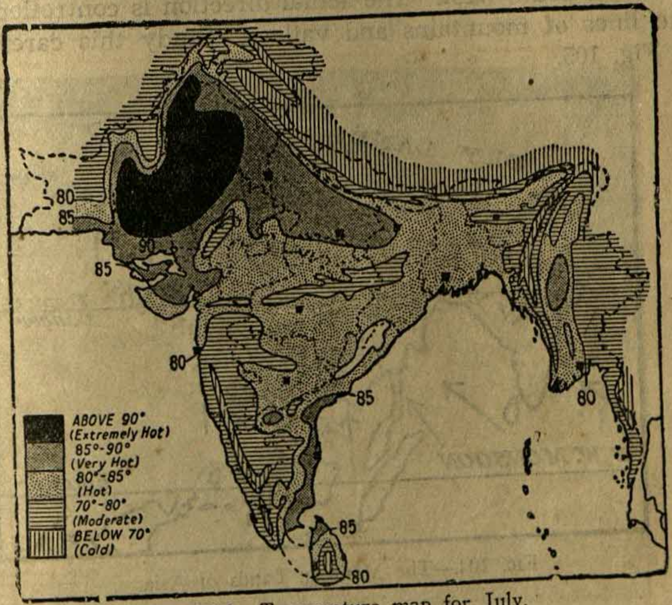


FIG. 103.—Temperature map for July.

A small area has been left blank near the east coast. How should it be shaded and why?

**Winds.**—Notice the position of India on a map of the world. It lies in the belt of the North-East Trade Winds. These winds actually blow in India from about the end of October to February or March, but we usually refer to them here as the North-East Monsoon. The North-East Monsoon is a land wind and is dry. The land mass in Northern

India gradually gets hotter, until in May or early June the hot air rises. A current of cool air is drawn in forming the South-West Monsoon. Since this wind comes from the sea, it brings rain to most parts of India. The North-East Monsoon does not everywhere blow from the north-east, neither does the South-West Monsoon everywhere come from the south-west. The actual direction is controlled by the lines of mountains and valleys. Study this carefully in Fig. 105.

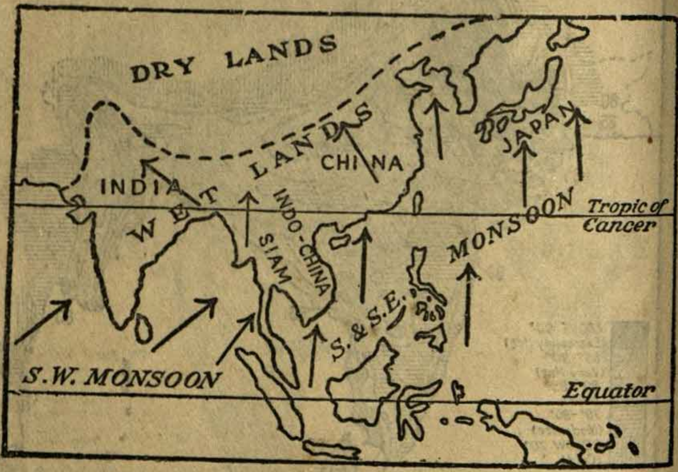


FIG. 104.—The Monsoon Lands of Asia.

Most places round the coast of India enjoy land and sea breezes, which help to keep the climate of the coast equable.

**Rainfall.**—India receives most of its rain from the South-West Monsoon, and hence the rain falls from June to October. Fig. 106 is a simple rainfall map of India for the year. Notice that it has marked on it only three rainfall lines, which divide India into four parts:

(*a*) Good Rainfall Division with more than 80 inches in the year. In the plains rice is everywhere the most important crop, and the hills are covered with thick evergreen forest or jungle.

(*b*) Moderate Rainfall Division with between 40 and 80 inches of rain in the year. In the hills fine forests of valuable teak and sal trees flourish with this rainfall. In the plains many crops can be grown without irrigation and there is a mixture of dry-zone and wet-zone crops.

(*c*) Poor Rainfall Division with between 20 and 40 inches of rain. Here the dry-zone crops such as millet grow; wet-zone crops such as rice can only be grown with the help of irrigation. The hills are largely covered with scrub, because it is not wet enough for forests to grow properly.

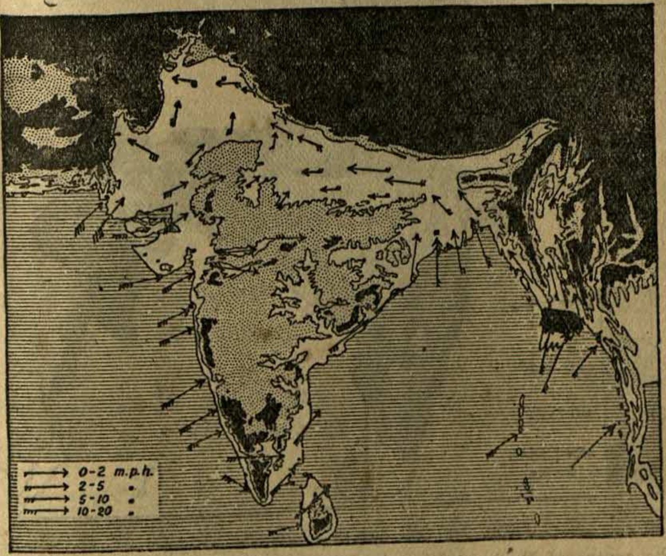


FIG. 105.—Map of India showing monsoon arrows.

(*d*) Desert and Semi-Desert with less than 20 inches of rain. It is almost impossible to grow any crops at all without irrigation.

*Rainfall in Southern India, Ceylon, etc.*—In most parts of India the rains cease in September or October, but the Madras coast in Southern India, the island of Ceylon, and South Burma get a considerable amount of rain in October, November, and December. The north-east monsoon has to cross the sea before reaching these parts. Consequently it collects some moisture and deposits it on the coast, especially soon after the south-west monsoon has changed round into the north-east. Baluchistan and northern Kashmir are both outside the Monsoon region. They are both dry but receive their rain or snow mainly in the colder months. Look again at Fig. 106 and notice the heavy rainfall on the west coast and the small rainfall in the interior of Peninsular

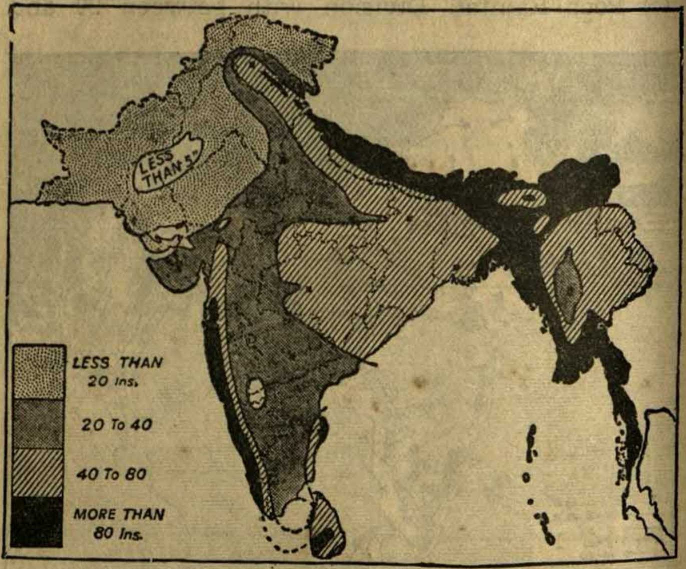


FIG. 106.—Rainfall map for the year.
In the centre of Peninsular India a small patch has been left blank. How should it be shaded, and why?

India. The centre of Peninsular India lies in the "Rain-shadow" of the Western Ghats. Notice the dry belt in the centre of Burma. This area is in the rain-shadow of the Arakan Yoma and there are the heavy relief rains on the western side of the Arakan Yoma. Again, the centre of the Brahmaputra Valley in Assam is in the rain-shadow of the Khasi Hills. Cherrapunji on the southern slopes of the hills catches the full force of the monsoon and has one of the heaviest rainfalls in the world.

*Storms.*—Thunderstorms usually occur just about the beginning and end of the "Rains." When the North-East Monsoon has died away and the South-West Monsoon is just about to commence, the atmosphere is very disturbed and thunderstorms occur. The same thing happens when the South-West Monsoon changes to the North-East in October. Violent storms often occur in the drier parts of India. There the sun shines very brilliantly and the land becomes very hot by day, but at night gets very cold. The great difference in temperature often causes severe storms, which may sweep across India and do much damage. Dust-storms in the deserts are much to be feared as are the cyclones at sea.

**The Seasons.**—Summarising what we have learnt of the climate of India, we may divide the year into three parts:

(*a*) The Cool Season from about the middle of October to the end of February, when the temperature is comparatively low and there is little or no rain.

(*b*) The Hot Season from March to June, when the sun is shining vertically over India and the land gets very hot.

(*c*) The Rainy Season from about the middle of June to the middle of October. The South-West Monsoon is blowing and bringing the rain. It is cooler, because the clouds protect the land from the sun and the rain cools the air. The Rainy Season commences, or as we say the rains break, at slightly different times in different parts of India, but June 15 is a normal time in many places.

## NATURAL REGIONS

India is a very large country and we have to divide the physical divisions of the country into their natural regions as follows:—

**The Mountain Wall.**—These are as follows:

(1) The Eastern Hills Region comprising the eastern part of the mountain wall separating India from Burma. It is wet, forested, and thinly populated.

(2) The Himalayan Region comprising the Himalayan Mountain Chain from 5,000 feet upwards.

(3) The Sub-Himalayan Region comprising the foothills between the plains and the mountains as well as the lower slopes of the Himalayas up to 5,000 feet.

(4) The Tibetan Plateau on the far side of the Himalaya Mountains. It is the highest plateau in the world, away from the reach of the monsoon. It is an Alpine desert.

(5) The North-Western Dry Hills cover the north-western part of the mountain wall and form a very dry region.

(6) The Baluchistan Plateau is a dry plateau surrounded by hills.

**The Hindustan Plain.**—The great alluvial plain of Hindustan is divisible according to climate as follows:—

(7) The Lower Indus Valley or Sind, a very dry alluvial plain depending on inundation canals from the River Indus.

(8) The Punjab Plains, another very dry alluvial plain depending on canals from the five rivers of the Punjab.

(9) The Upper Ganges Valley, a dry region in which nearly half the country depends on perennial irrigation canals from the Jumna and Ganges.

(10) The Middle Ganges Valley, an intermediate area, with a mixture of wet-zone and dry-zone crops.

(11) The Lower Ganges Valley or the Deltas, a wet alluvial region with wet crops, notably rice.

(12) The Brahmaputra Valley, a wet valley much narrower than the Ganges Plain and less thickly populated.

**The Indian Plateau.**—The whole of India south of the Hindustan Plain may be called the Indian Plateau. We might call it Peninsular India, but most people when they use that term mean only the land south of the Satpura Range. We may distinguish ten natural regions grouped as follows:

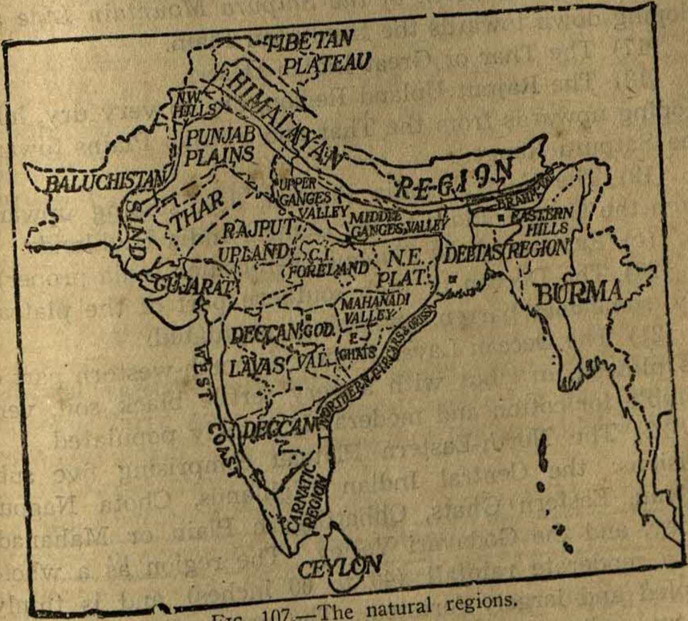


FIG. 107.—The natural regions.

(*a*) *Coastal Regions round the Plateau proper.*

(13) The Gujarat Region, dry or moderately dry, hilly in places.

(14) The West Coast Region comprising a narrow coastal plain and the slopes of the Western Ghats; very wet.

(15) The Carnatic or Tamil Region comprising a broad coastal plain and an inland hilly part; moderately wet, with the rain falling in October, November, and December.

(16) The Northern Circars Region including Orissa, a coastal plain moderately wet.

(b) *Regions north of the Satpura Mountain Line* and sloping down towards the Hindustan Plain.

(17) The Thar or Great Indian Desert.

(18) The Rajput Upland Region, dry to very dry, hilly, sloping upwards from the Thar and Punjab Plains towards the Satpura Range.

(19) The Central India Plateau, dry, sloping upwards from the Ganges Plain to the Central India Highlands.

(c) *Regions of the Plateau* (Peninsular India proper).

(20) The Deccan or high southern part of the plateau, dry, somewhat barren, and thinly populated.

(21) The Deccan Lavas Region or north-western part of the plateau, dry but with a very fertile black soil, very suitable for cotton and moderately thickly populated.

(22) The North-Eastern Plateau comprising five subdivisions: the Central Indian Highlands, Chota Nagpur Plateau, Eastern Ghats, Chhattisgarh Plain or Mahanadi Valley, and the Godavari Valley. The region as a whole has a moderate rainfall (40 to 60 inches) and is thinly peopled and largely forested. The people live mainly in the two valley areas.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate your answers with diagrams, sketches, etc.

1. Draw a sketch map of India and show on it all the mountain ranges. How far do these affect the distribution of rainfall in India?

2. Draw a map of India showing its broad natural regions with their characteristic products. (B. U. 1922)

3. Compare and contrast the rivers of the Deccan with those of Northern India. (B. U. 1919)

4. What is meant by an alluvial plain? How are such plains formed? Illustrate this with reference to the Indo-Gangetic plain.

5. Account for the following:—

(*a*) India is fortunate in her natural boundaries.

(*b*) The July isotherms in India are not so regular as the January isotherms.

(*c*) As you go up the Gangetic Valley the rainfall decreases.

(*d*) The south-eastern tip of India has rains from November to February.

(*e*) The Deccan is frequently liable to famine.

6. Draw a map of the India showing areas of heavy, moderate and scanty rainfall.

Briefly explain the cause of the difference in the amount of rainfall in different areas. (B. U. 1930.)

7. What are the chief minerals in India? Where are they located? Draw a diagram showing the comparative values of the following minerals produced in one of the recent years. The values are given in lakhs of £ Petroleum 47, coal 46, gold 20, building material 8, salt 8½, saltpetre 1, mica 3, lead 8½, silver 5, tin 5, manganese 1½, copper 4, iron ore 2.

## CHAPTER XIX

## VEGETATION, IRRIGATION AND CROPS

**Natural Vegetation.**—India is a thickly populated country and over large areas the natural vegetation has been removed by man. The following are the principal kinds of natural vegetation:—

(*a*) *Evergreen Forest.*—Where the rainfall is more than 80 inches in a year we find forest in which the trees are green all the year round. There are many different kinds of trees in these forests; often they are of large size. But the wood of the trees is very hard, and up to the present has not been much used commercially. In these areas of very heavy rainfall, nearly all the lowland has been cleared to make room for paddy-fields, but we find the forest, the natural vegetation, on the hills. Note where it occurs in Fig. 108. It is found on the slopes of the Western Ghats; in the wetter eastern parts of the Himalayas up to 5,000 feet above sea-level; Assam; the Arakan coast of Burma and Lower Burma.

(*b*) *Monsoon Forest.*—Where the rainfall is more than 40 inches but less than 80 inches, the forest gets dry in the Hot Season. The trees lose their leaves to protect themselves against the heat of the sun, and so the forest is leafless for part of the year. Such forests have trees but they are not evergreen. We call them "Monsoon Forests". They are very valuable, for in them grow the most important trees of India. The two most useful trees are the teak, which comes from Burma and the western part of the Indian Plateau, and the sal, which grows along the lower slopes of the Himalayas and in the north-east of the plateau. The Monsoon Forests are so valuable that they are largely "reserved" by Government to prevent them from being destroyed by careless and wasteful use.

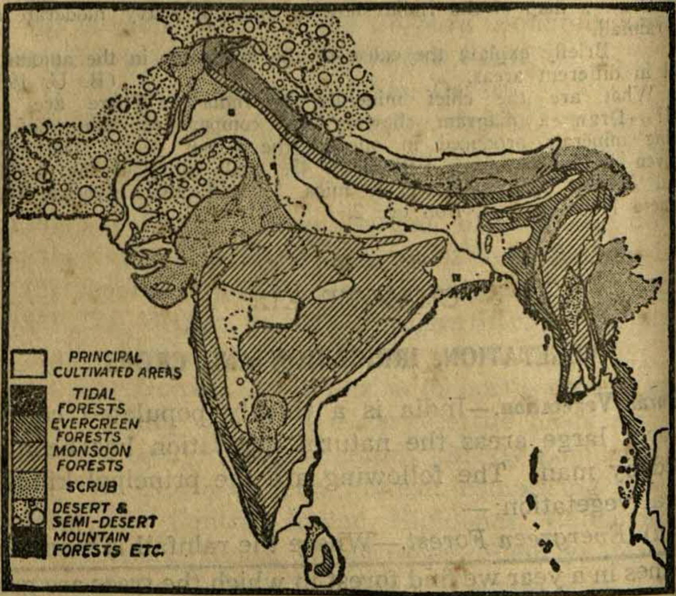


FIG. 108.—The natural vegetation.

(c) *Scrubland.*—Where the rainfall is less than 40 inches in a year we find it is usually too dry for forests to grow properly. A few trees grow, but most of them are armed with spines or thorns to prevent their being eaten by animals. Forests of small thorny trees are called Thorn Forests. Sometimes the trees are so small that they are really only bushes and are often far apart (scrubland). Scrubland covers large areas in the drier parts of India and Burma.

(d) *Desert and Semi-Desert.*—As the climate gets drier and drier, so the thorny trees and bushes become rarer. There we find plants with thick fleshy stems and very long roots, which store up water in their fleshy stems and leaves.

(e) *Grassland.*—There is not much grassland in India. Patches occur on hilly regions, interrupting the Monsoon Forests.

(f) *Mountain Forests.*—On the hills and mountains of Southern India above 5,000 feet, and in Burma and on the Himalayas above 3,000 feet we find a great change. The forests are more like those found in Temperate lands. The trees are evergreen: some of them are of broad-leaved types like the oak, others have tall unbranched trees with needle-shaped leaves (Coniferous or Pine Forests). These forests are especially important on the Himalayas.

(g) *Alpine Vegetation and Alpine Forests.*—On the highest parts of the mountains it is too cold for trees to grow. We find only small bushes and short grass, or where it is very dry practically nothing at all. On the very highest parts of the mountains of Northern India (above 18,000 feet) there is always snow.

(h) *Mangrove Forests.*—There are certain trees, which must have their roots covered by salt water at every high tide. The Mangroves are the most important. We find them growing along the sea-coast where it is flat and muddy, and in the great river deltas. The mangrove forests of the Ganges Delta are called the "Sundarbans" from *sundri*, the Bengali name for mangrove.

**Useful Forest Products.**—The most valuable timber is teak mainly from Burma. The pyinkado or Burma ironwood, is another important tree largely used for railway sleepers. The sal gives a good timber also. The pine trees of the mountains yield fine soft wood as well as timber and resin, but the forests are difficult to reach. Many of the poorer kinds of wood in all parts of India are used for firewood. The mangrove forests are found in deltas where no other wood is available, and are therefore valuable for fuel. Bamboo is really a very large grass and grows in many parts of India, especially in the Monsoon Forests. It is used for many purposes. Another forest product is lac, a sticky substance, produced by insects living in the forest trees.

The method of working the timber of the forests is interesting. It is cut in the dry season and dragged to the small streams by elephants or buffaloes. When the rains come the streams rise, and the logs are floated down to the bigger rivers. These logs are then joined together to form "rafts" and again floated down the rivers to saw mills, where the wood is cut up into planks.

## AGRICULTURE

India is essentially an agricultural country. Nine-tenths of the vast population depend on agricultural pursuits for their existence. The following are some of the principal crops of India.

*Rice* is grown mainly on flat alluvial land where there is an abundant rainfall. Its distribution is shown in Fig. 109. It forms the staple food of the people in the wetter regions of India. In the drier regions it becomes less important, and where the rainfall is less than 40 inches it can only be grown on irrigated land.

*Wheat*, which forms the principal food grain of most white races, has become the favourite food in the drier parts of Northern India. It is there a winter crop, so that the land can often be used for other purposes during the rest of the year. It is sown at the end of the rains, and ripens at the end of the year before the great heat commences. So much is grown that there is usually some over for export to Europe. Unlike rice, wheat requires only a moderate amount of water and would be killed if the young plants were covered by water as rice is. Wheat is a very important crop

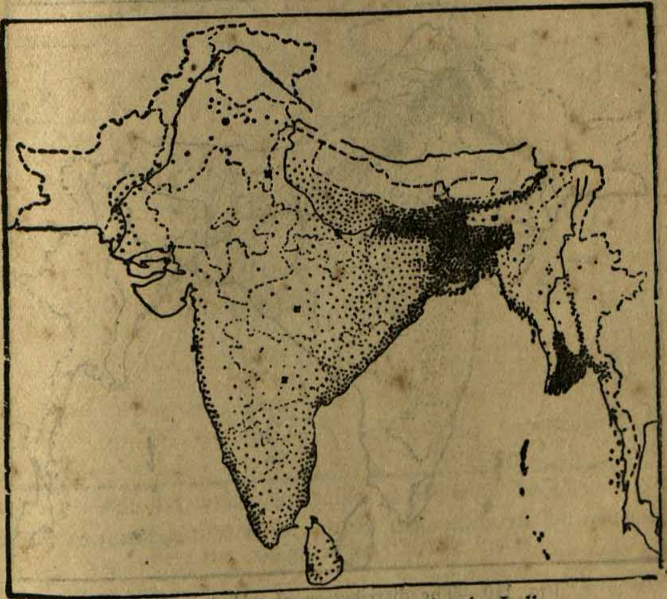


FIG. 109.—The distribution of rice in India.

Each dot represents 50,000 acres.

in the Punjab and many of the northern parts of India, where the rainfall is less than 40 inches. As we travel down the Ganges Valley into wetter regions it gradually disappears. This can be seen from Fig. 110.

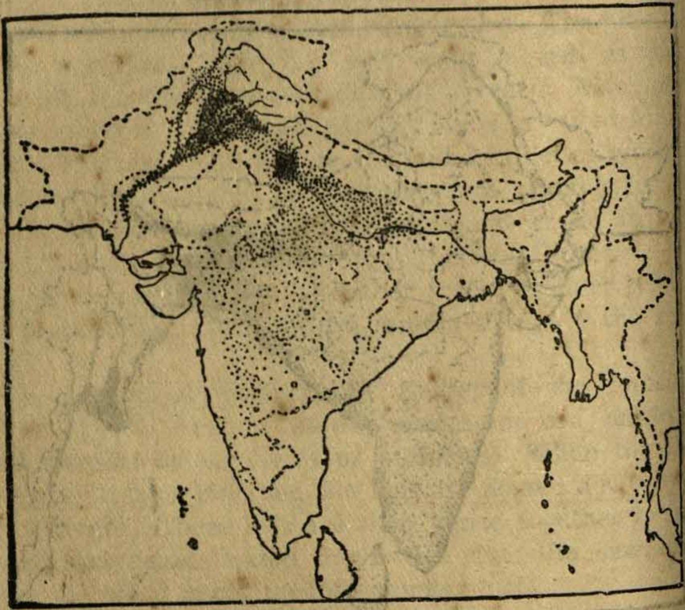


FIG. 110.—The distribution of wheat in India. Each dot represents 20,000 acres.

*Barley.*—Barley is another important crop which grows largely in the same districts as wheat.

*Millet* forms the staple food of the people in most of the drier parts of India. There are several different kinds, the three principal being *jowar, bajra* and *ragi*. Where the rainfall is less than 40 inches millet is important, and it can be grown without irrigation even when the rainfall is as low as 20 inches. When the rainfall exceeds 40 inches it disappears. Fig. 111 shows the distribution of millet.

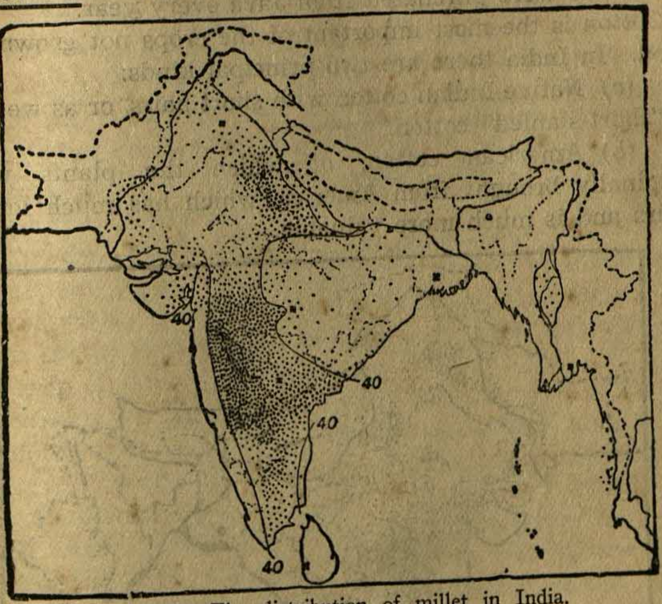


FIG. 111.—The distribution of millet in India.
Each dot represents 50,000 acres. Notice that nearly all the millet grows where the rainfall is less than 40 inches.

*Maize* is grown both for its grain (Indian corn) and as fodder for cattle. In India it flourishes both on the plains and in the hills where the rainfall is moderate. We find it with millet in dry regions, but also in damper regions too. But in the Lower Ganges Valley with a rainfall of 60 inches it disappears.

*Pulses* of many kinds are cultivated throughout the country. The most important is gram, which affords a good food as well as fodder for cattle and horses.

*Sugar-cane* is grown in nearly all the provinces of India, but most comes from the irrigated lands of the Upper

Ganges Valley and the Punjab. From it jaggery is made. Much sugar is now produced in India, formerly enormous quantities were purchased from Java every year.

*Cotton* is the most important of the crops not grown for food. In India there are two principal kinds:

(*a*) Native Indian cotton with short hairs, or as we say, a "short-stapled" cotton.

(*b*) American cotton, of which the plants were originally brought from America, which has much longer hairs and is much more valuable.

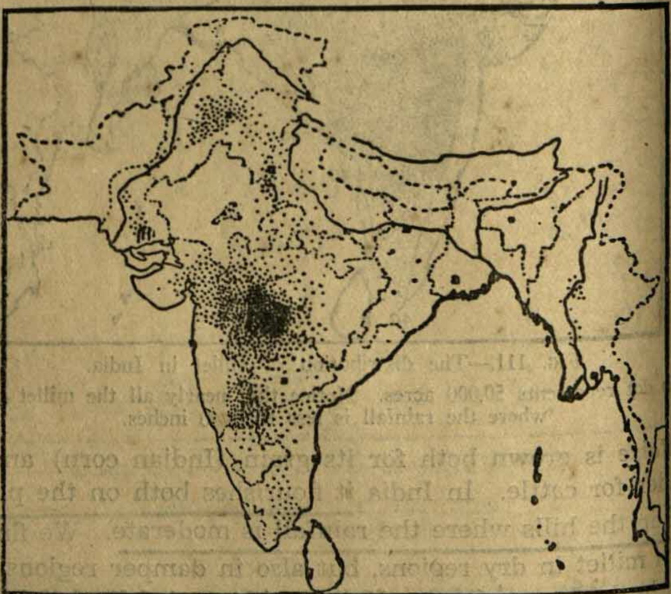


Fig. 112.—The distribution of cotton in India.
Each dot represents 20,000 acres.

Cotton is a dry region crop, and flourishes where the rainfall is less than 40 inches. The soil is important; one of the best is the sticky black cotton soil produced by the weathering of the Deccan lavas. The American cottons require more moisture and have to be grown on irrigated and carefully prepared soil as in the Punjab. Fig. 112 shows the distribution of cotton.

*Jute* is a crop which is different from almost all others in that it is grown in enormous quantities in one part of the world only, and that is in the very wet lands of the Ganges Delta. The stems yield a very strong fibre from which most of the sacks in the world are made. Like rice it is a plant of the low, wet lands.

*Oilseeds.*—Plants grown for the sake of the oil obtained from their seeds include linseed, mustard, sesamum, and ground-nuts. They grow best with a medium rainfall, and often prefer slightly hilly country. A good proportion of the crop is grown for export.

*Coconuts* are also grown largely for the sake of the oil obtained from their nuts. The dried kernel of the nut known as copra is a valuable product and is sent abroad to be manufactured into soap, etc. A useful fibre, called coir, much used for making matting, is obtained from the outer shell of the nuts. Coconuts grow best in wet regions along the coast and are grown down the west coast, in the island of Ceylon, in the Nicobar and other islands of the Indian Ocean, and on parts of the east coast.

*Tea.*—The tea-plant is a shrub which requires a heavy rainfall, but must be grown on hill slopes or where the water does not remain near the roots. Most of the tea is grown for export. The hill slopes bordering the Brahmaputra Valley in Assam, the Himalayan slopes near Darjeeling and Dehra Dun, the island of Ceylon, and the slopes of the Nilgiri Hills are the chief centres. Tea is obtained from the dried leaves of the shrub.

*Coffee* was once important in Mysore.

*Tobacco.*—Soil is often more important for tobacco than rainfall, and a little is grown in most districts. In some places, like the delta of the Irrawaddy, enough is grown to be exported.

*Rubber.*—There are numerous rubber plantations in Ceylon and some in Lower Burma and Travancore.

*Indigo* is a small plant from which a purple dye is made. It is used to be important in the Ganges Valley, but it is now possible to make chemical dyes cheaply, and the growing of indigo is not nearly so important as it was.

*Opium* is obtained from the seed-capsules of the opium poppy. It is smoked by the Chinese in small pipes instead of tobacco, and large quantities used to be sold to China. But it is not good for the people, and the Government has agreed not to sell any more and very little is now grown.

**Animals.**—Just as the natural vegetation has disappeared over large areas in India, so the wild animals have disappeared also. We have to go to the mountains or the thick forests or wild uninhabited lands to find the wild animals. Famous wild animals of India are the tiger and the elephant. Large numbers of elephants live in the wilder parts of the Monsoon Forests, and every year many are caught and trained. There are wild buffaloes and many small animals in most parts of India. Every year many people die from snake-bite. In some of the rivers crocodiles are dangerous. India is an agricultural country, and large number of buffaloes and oxen are needed for ploughing and as beasts of burden. In hilly regions horses, ponies, mules, and donkeys are more useful. In dry sandy regions mules, and donkeys are much used. Then the flesh of animals is eaten in many parts. They eat beef from oxen, and mutton from sheep and goats. People also get milk to drink from cows and goats, and butter can be made from the milk of the cow. The animals also provide us with clothing—wool from sheep, goat's hair from goats, and hair from camels; whilst leather is made from the skins of buffaloes, oxen, sheep and goats.

*Elephants.*—The elephant is a very intelligent animal, and at the same time is very strong. He is most useful in the forests where trees are being cut down for timber. He has been taught to drag great logs of wood, or pick them up in his trunk and carry them and arrange them in neat piles. He is also used as a beast of burden, and can travel through thick jungle where there are no roads for bullock-carts.

*Oxen* are probably the most useful animals in India. There are enormous numbers of them, because they are used for ploughing and for drawing carts all over India. There is roughly one bull or bullock or cow for every two people. In many countries of the world, where horses or machines are used for ploughing, the bullocks are killed and used for food, while the cows are kept for the sake of their milk. The bullocks are valued more than the cows. In some parts of India, especially in the United Provinces, good rich fodder is grown and dairy farming is carried on. In many of the drier parts of India there is not sufficient grass to feed the oxen, so fodder has to be grown for them.

*Buffaloes.*—There are 40,000,000 buffaloes in India. The buffalo is heavier and stronger than the ox, but slower. He is very fond of water and is much used in the rice-fields for ploughing.

*Sheep.*—There are 25,000,000 sheep in 'British' India. They live mainly on the dry hilly parts, where they can live on grassland or waste land which is not good enough for cattle. They are most abundant in Madras. Compared with the sheep of other parts of the world, those of India are very poor. They do not give very good wool or meat.

*Goats.*—Goats are to be found everywhere in India, for they are very easy to keep. They can live on the poorest of grass or shrubs, and find enough to eat even in the driest parts.

*Horses and Ponies.*—There are less than two million horses and ponies in India, but they are not used for ploughing as they are in other countries of the world. They are mainly used for drawing small carts.

*Mules and Donkeys.*—Mules are very valuable in hilly regions, as they are very sure-footed and do not slip on the narrow mountain paths. So goods are strapped on to their backs and carried across the mountains. Donkeys are used in the same way in the drier parts of India, and can travel long distances across dry sandy country.

*Camels.*—The camel is called the ship of the desert because it can travel across deserts going for long periods without water, and has broad feet which do not sink into the desert sand. So we find there are many camels in the dry parts, but none at all in the wet regions. This is an excellent example of "Climatic control" in relation to animals.

**Irrigation in India.**—We have learnt from the rainfall map that a large part of India is too dry to grow crops easily. But rain is not the only source of water and water can be brought to the fields by irrigation.

*Perennial Canal Irrigation.*—By far the most important type of irrigation is by means of canals which have water in them all the year round. Many of the canals are hundreds of miles long, and the construction of them costs enormous sums of money. The Government has spent the tremendous sum of £75,000,000 on irrigation works in India, and 50,000,000 acres have been made fertile for the poor farmers. The most important works are in the drier parts of the great Hindustan Plain—in the Punjab, United Provinces, and Sind. Although the rainfall in these parts of the Hindustan Plain is poor, there is a good rainfall, as well as a heavy snowfall on the Himalaya Mountains to the north. As a result, the rivers which rise in those mountains are never dry, but are always bringing water down from the mountains to the plains. In some seasons of the year there is more water than at others. It sometimes happens that most water is required for irrigation when the river is at its lowest. The first stages in building a canal are:

(1) To choose a suitable spot on the river where its supply of water can be tapped.

(2) To build across the river a wall (called a dam or weir), so that the water can collect behind to form a lake which will never be dry. In the rainy season more water will flow into this lake than is required, and it is allowed to escape over the wall. But in the dry season nearly all the water in the lake will be used for the canal. The dam or weir from which the canal starts is called the "heads" of the canal. The main canal is then cut across the country. When the surface of the land slopes more rapidly than is desirable for the canal, the canal has to be built upon an embankment. From the main canal big branch canals are constructed. The water is actually distributed to the land through a series of small side branches called distributary canals. The amount of water passing into these small canals has to be carefully regulated. The largest and most recent dam is at Sukkur, on the river Indus, in Sind.[1] Opened in 1932, it will irrigate 5½ million acres. Besides the great works in the Hindustan Plain, there are important canal systems in Madras and Central Burma.

*Inundation Canals.*—In Sind and in certain other parts of India canals were constructed starting from the bank of a river. The water of the river overflows into them in the flood season, but in the hot season the canals dry up, so that they are not nearly so useful as the permanent canals. Sind now has permanent canals.

*Tanks.*—In most of the drier parts of Peninsular India mud walls are built across the valleys of small streams, so that water collects and forms a pond or lake during the wet season. Such ponds or lakes are called tanks. When the rainy season is over, the water from the tanks can be used, but in the hot season the tanks dry up completely. In bad rainfall years the banks may not even be filled during the rains.

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[1] Now in Pakistan.

*Wells.*—Although the surface of the land may be dry in the drier regions, there is often water at a short distance below the surface. This water can be reached by wells and brought up to the surface.

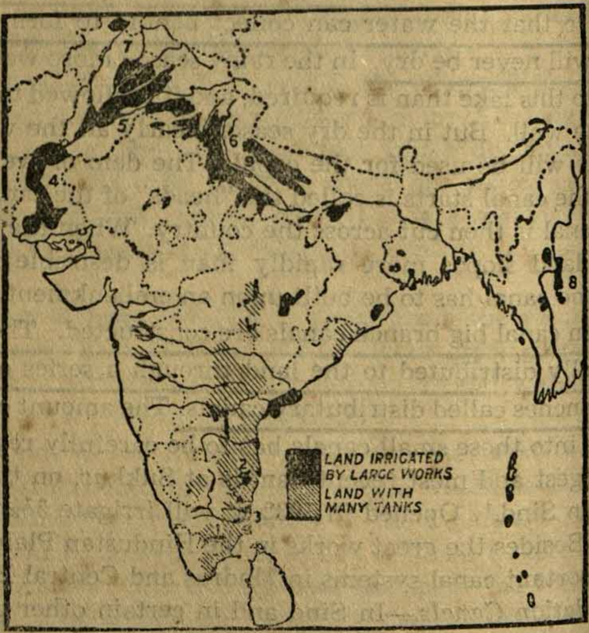


FIG. 113.—Irrigation in India.

1, 2, 3 = Madras; 4 = Sind; 5 = Punjab; 6, 9 = United Provinces; 7 = Peshawar area; 8 = Dry zone of Burma.

*Karez.*—In Baluchistan, as in no other part of India, there is a very clever system of irrigation. Long underground tunnels called karez have been constructed to reach water at the foot of the hills and to bring it out on to the alluvial plains.

In bad rainfall years the crops may fail and the people be without food. Notice that famine is not to be feared in tracts irrigated by large works, but in the dry parts where irrigation cannot be carried out. The drier parts of the plateau suffer most. Fig. 113 shows the more important irrigated regions.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate your answers with diagrams, sketches, etc.

1. Describe the major natural regions into which India can be divided and describe the climatic conditions and natural vegetation of each.

2. There are several types of forests in India. Where exactly are they situated? And what kinds of timber do these forests yield?

3. Describe with the help of sketch maps the relation between the climate and the natural vegetation of Indian sub-continent.

4. Write a note on the live-stock and dairy produce in the Indian Empire.

5. Where in India is tobacco grown? What soil and climate does it require?

6. (*a*) What are the three principal millets grown in India?
   (*b*) "India produces fruit and spices." Illustrate.

7. Mention the seasons for the cultivation of crops in India. What are "Rabi" and "Kharif" crops? (B. U. 1927)

8. Give reasons for the following:—
   - (i) Berar produces cotton.
   - (ii) Bengal grows more rice than Burma.
   - (iii) Half of the total production of sugar is from the United Provinces.
   - (iv) Rice grows abundantly on the western side of the Western Ghats and not as much on the eastern side. (B. U. 1928)
   - (v) There are more irrigation canals in Sind and the Punjab than elsewhere in India.

9. Account for the importance of irrigation works in India. Mention the chief localities where these have been constructed and say how these localities favour such construction. Mark on an outline map of India the areas under irrigation. (B. U. 1935)

*Or*

Why is irrigation necessary in some parts of India? What parts of India do not require irrigation and why?

10. (*a*) Draw a map of India and show on it areas producing coal, tea wheat, rice and cotton.
    (*b*) What kind of climate and soil are favourable to the growth of tea, wheat and cotton? (B. U. 1933)

*Or*

Where in India are the following largely produced? Rice, cotton, wheat, sugar, tea, leather.
Mention the circumstances that favour the growth of these commodities in those areas.

## CHAPTER XX

## POPULATION, INDUSTRIES AND COMMERCE

**Distribution of Population.**—In the whole of India there are about 380,000,000 (three hundred and eighty millio or 38 crores) people. Now this large number is no

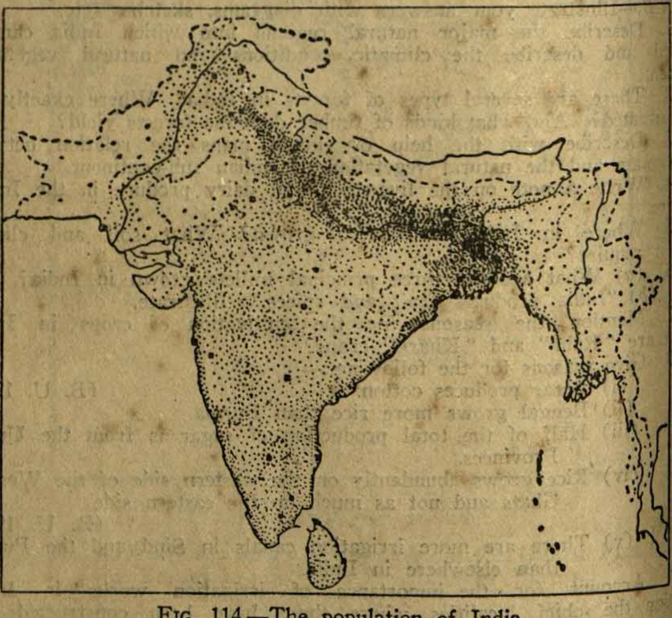


FIG. 114.—The population of India.

Each dot represents 100,000 people. Each square dot represents a town wit more than 100,000 people.

scattered equally all over the country. Some parts are thinly populated, other parts are thickly populated. Fig. 114 is a population map of India on which each dot represents 100,000 people. Comparing this map with the physical, vegetation, and rainfall maps we find that the population is densest:

(1) in the lowlands or slightly hilly regions;

(2) on the tracts of alluvium;

(3) both in dry and wet districts;

(4) where the natural vegetation has been removed and cultivated land is shown.

*Urban and Rural Population.*—Look again at Fig. 114.

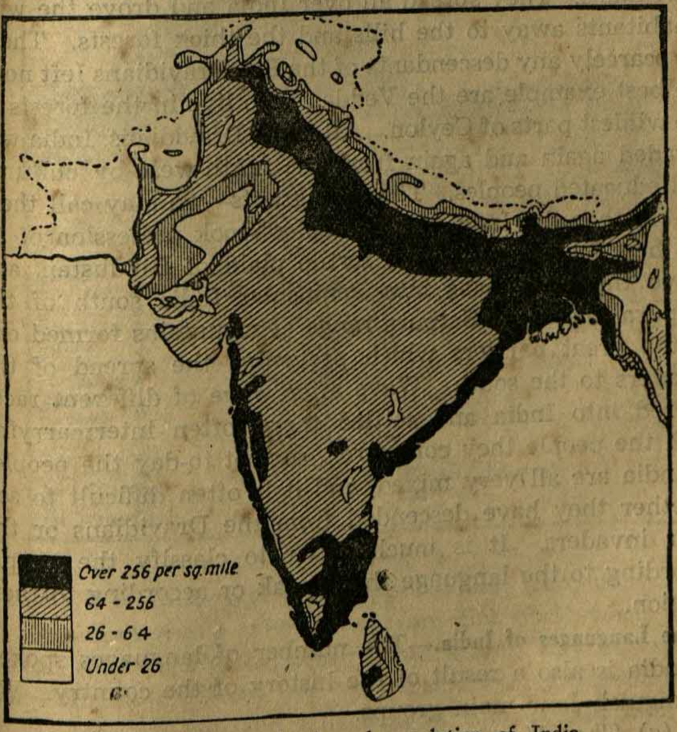


FIG. 115.—The density of population of India.

Compared with its size there are few large towns in India where the "industrial" population is concentrated. The population is mainly "rural," that is, the people live in the country near their fields. The population is dense where agriculture is important, as can be seen from Fig. 115.

**The Races of People in India (excluding Burma).**—The distribution of the different races of people in India is a result of the history of the country. Ages and ages ago the only people living in India were very wild uncivilised peoples, whom we call the Pre-Dravidian peoples. Then India was invaded by cleverer people whom we may call the Dravidians. They spread all over India and drove the wild inhabitants away to the hills and the thick forests. There are scarcely any descendants of the Pre-Dravidians left now, the best example are the Veddas, who live in the forests in the wildest parts of Ceylon. After the Dravidians, India was invaded again and again from the north-west by cultured and educated peoples. The immigrants—we may call them all together the Indo-Aryan peoples—took possession of all the best land, such as the fertile plain of Hindustan, and drove the Dravidians into Peninsular India south of the Satpura line. The Satpura range of mountains formed one of the great barriers which prevented the spread of the invaders to the south. Wave after wave of different races poured into India and settled there, often intermarrying with the people they conquered, so that to-day the peoples of India are all very mixed, and it is often difficult to say whether they have descended from the Dravidians or the later invaders. It is much easier to classify the people according to the language they speak or according to their religion.

**The Languages of India.**—The number of languages spoken in India is also a result of the history of the country. We distinguish four main groups.

(*a*) *The Munda languages* probably represent the languages spoken by the oldest or Pre-Dravidian inhabitants of India. The languages are very curious; long words are made by stringing together a number of short ones, so that one long word often means as much as a long sentence with us. Munda languages are only spoken by a few of the wildest of the hill tribes who live in the thick forests of the Chota Nagpur plateau.

(b) *The Dravidian languages*, once spoken over most of India, are now confined to the Peninsula (See Fig. 116). The principal ones are Tamil, Telugu, Malayalam, Kanarese, and Tulu.

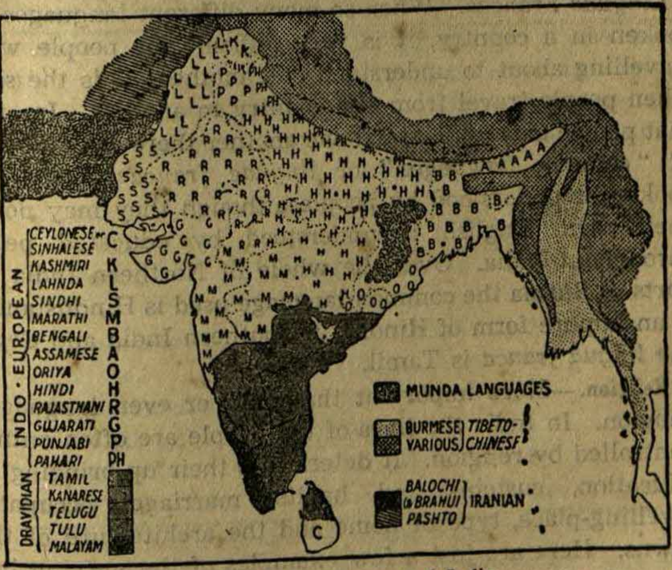


FIG. 116.—The languages of India.

(c) *The Indo-Aryan languages* which were introduced by the immigrants who came from the north-west, have spread all over Northern India and a long way down into the Peninsula. There are very numerous different ones. In Baluchistan and the hills nearest the original home of the languages we find Baluchi, Pushto, and Brahui (not spoken by many people). Going south-eastwards are Sindhi, Gujarati, Marathi, and Rajasthani farther north; going north-eastwards are Pahari, Lahnda, Punjabi, Kashmiri, Western and Eastern Hindi, Bihari, Oriya, Bengali, and Assamese.

(d) *The Tibeto-Chinese languages,* which again are quite different, are the languages of the Mongol peoples. Different languages of this group are spoken by the hill tribes of the Himalayas, such as the Lepchas, and also over most of Burma, where the principal language is Burmese.

*Linguae Francae.*—When so many different languages ar spoken in a country, it is very difficult for people whe travelling about to understand one another. It is the sam when people travel from one country to another. In orde that people may understand one another there are a numbe of "common languages" or *linguae francae,* which a spoken or understood by people although they may not their own. English is understood by educated peop throughout India. Over the whole of Northern India a parts of Burma the common language used is Hindustani. is an impure form of Hindi. In Southern India and Ceyl the *lingua franca* is Tamil.

**Religion.**—More important than race or even language religion. In India the lives of the people are often entir controlled by religion. It determines their up-bringing a education, customs and habits, marriage, occupati dwelling-place, type of home and the architecture of th towns. Here are just a few examples of the varying in ence of religion. To the Hindus the cow is a sacred ani and they will not eat beef; to the Mohammedans the pi an unclean animal and they will not eat pork. It is forbid for a Buddhist to take life. Early marriage is the cus amongst certain Hindus, and in some parts of India "purdah" system is observed—which, when stri followed, does not permit the women to be seen at all in public and prevents the menfolk from visiting the house of people other than near relatives. Wherever Mohammedans are found, their mosques with the characteristic form of architecture are found also. Then there are "religious centres"—famous places of pilgrimage or seats of learning connected with one of the religions. Benares with its thousands of Hindu temples and its Hindu colleges is a centre of both the Hindu religion and the culture connected with it. Lahore is a great centre of Islam; whilst Rangoon and Mandalay in Burma and Kandy in Ceylon are centres of Buddhism. To the Hindus the River Ganges is the most sacred river in the world; to die or to be cremated on its banks is to gain everlasting peace. Hardwar, where the Ganges leaves the mountain, is another very sacred place of pilgrimage.

The principal religious sects are:

| | | |
|---|---|---|
| (*a*) Hindus | 239,195,000 | 68 per cent. |
| (*b*) Sikhs | 4,340,000 | 1 ” |
| (*c*) Jains | 1,250,000 | ·4 ” |
| (*d*) Buddhists | 12,800,000 | 3·5 ” |
| (*e*) Parsis | 110,000 | ·03 ” |
| (*f*) Mohammedans | 78,000,000 | 22 ” |
| (*g*) Christians | 6,300,000 | 2 ” |
| (*h*) Animists | 8,300,000 | 2·5 ” |

Many of the hill tribes, the backward peoples, are Animists —that is, they worship spirits which they say live in the trees or the rocks, etc. Nearly all the Buddhists live outside India, in Burma, and in Ceylon. The Sikhs are mainly in the Punjab; the Jains in Rajputana and neighbouring parts of Bombay; the Parsis in Bombay. The two greatest religions of all are Hinduism and Mohammedanism which are widely distributed. Mohammedanism came to India with the later invaders from the north-west, and so we find it predominates in Baluchistan, North-West Frontier, Kashmir, and th Punjab. There is also a strong centre of Mohammedanis in East Bengal. Hinduism predominates in other parts o India. Christianity was brought by seafaring peoples and i strongest near the coasts. Again we notice the geographica control of the spread of religions. Mohammedanism followe along the Hindustan plain, but did not penetrate strongly i Peninsular India. Jainism and the Rajput culture, as we

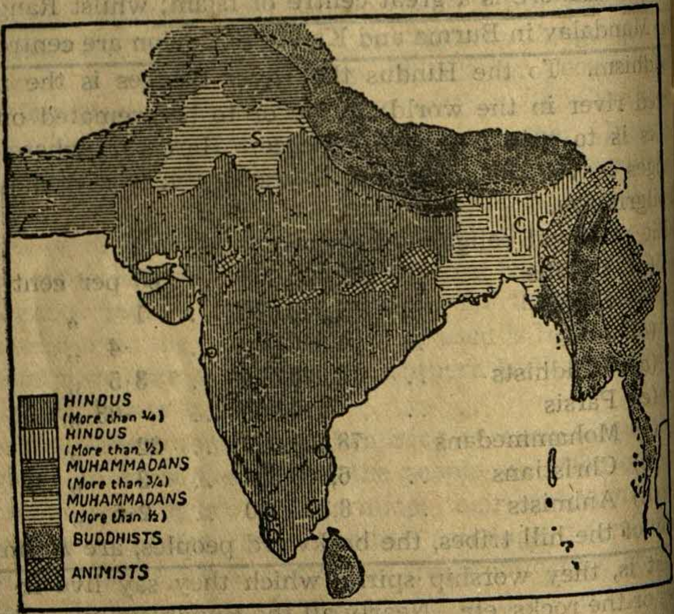


FIG. 117.—The Religions of India.

as the Rajasthani language, stopped short at the Sat Mountains. Fig. 117 will help you to understand the di bution of religions.

## MANUFACTURES AND TRADE

India is mainly an agricultural country. Although India has been an agricultural country, it has always been noted for the cleverness and skill of its people in making cloth and silk, working in metal, ivory and wood. But machine-made articles can be produced so much more cheaply than hand-made articles that India is fast taking her place in the world as a manufacturing country as well as an agricultural country.

### Industries

We distinguish:

(*a*) The old native industries of hand-made articles.
(*b*) The newer factory industries of machine-made articles.

(1) *Cotton Goods.*—The most important native industry has always been the weaving of cotton fabrics. Cotton is one of the native plants of India, and though enormous quantities are produced for export, nearly half is used in the country. In some parts of India and Burma every house has its handloom, where the women make saris for themselves or dhotis for their husbands. More important now are the great cotton factories. The most important cotton manufacturing centres are Bombay and Ahmedabad where over a quarter of a million people are employed in the cotton mills. There are also mills in the Madras Presidency and in the Central Provinces. For the manufacture of cotton goods a certain amount of moisture in the air is required. Bombay has this right amount of moisture, Karachi has not. So that, although Bombay and Karachi are both ports exporting raw cotton, only Bombay has cotton mills.

(2) *Jute.*—Calcutta is the centre of the jute mills. Jute is grown in the Ganges Delta. A large quantity is exported raw, but the mills round Calcutta and up the River Hooghly make large quantities of jute canvas and "gunny bags"—

which are sacks in which paddy and other grains can b packed for transport to U.S.A., Argentina, Australia an Europe.

(3) *Silk.*—India has long been famous for its beautifu silks, and many of the fine old towns are still noted fo special kinds. But the industry is very small when compare with cotton or jute. Much of the raw silk is importe from China, but native Indian silk is also produced Bengal is the chief silk-producing province. Brocaded sil goods are made in Bengal, the Punjab, and Southern India striped silks and the famous gold brocades all over Norther India at such centres as Agra, Benares, Amritsar, Ahmedabad, and Surat.

(4) *Woollen Goods.*—India has also long been celebrate for woollen goods, especially carpets and shawls. Th weaving of shawls is a typical industry of Kashmir. Carpe making is carried on in many parts, but especially in th Punjab, Kashmir, and the Central Provinces. Coar blankets are made in Northern India, where the winte are cold.

In the cotton, silk, and woollen industries native vegetab dyes such as indigo were used, but now cheap artificial dy are imported.

(5) *Metal Working.*—Iron work is an old industry of Ind but the great Tata Iron and Steel Works are the only lar modern iron works. The people use brass for cookin utensils, and so brass-working is an important industry many towns of Northern India, such as Benares. Bomb and Poona are centres of silver working; Jaipur and De of gold working.

(6) *Pottery.*—The making of pottery for domestic p poses is a native or "cottage" industry all over Ind

(7) *Other Manufactures.*—There are numerous rice-m in Burma; wheat-flour mills in the Punjab; saw-mills Assam and Burma; oil refineries in Burma, Assam,

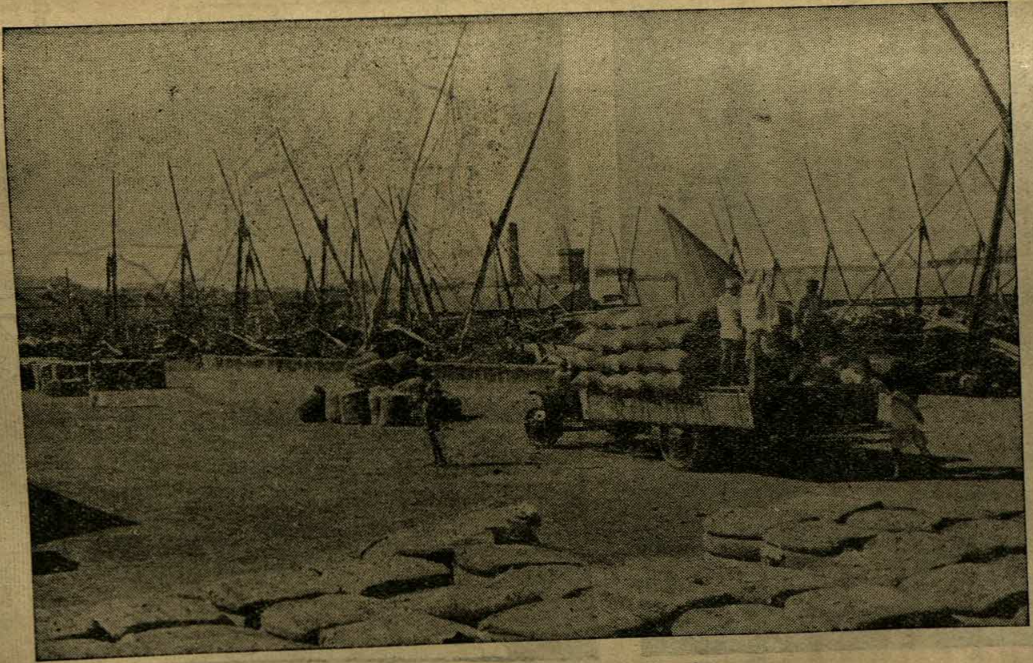


FIG. 118.—Cotton arriving in Bombay.

FIG. 119.—Bombay Harbour.

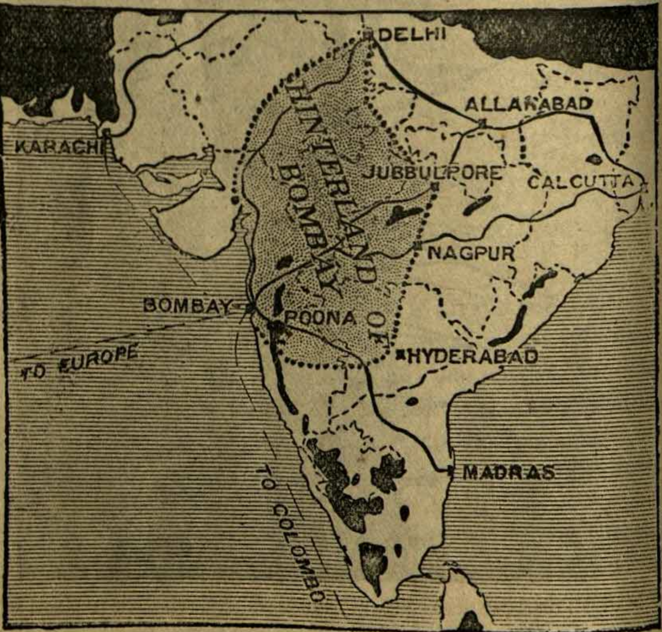


FIG. 120.—The Hinterland of Bombay.
Land over 2,500 feet, black.

the Punjab; tobacco factories in Madras, Burma, etc., as well as sugar-mills in various parts. In Southern India, the rubber industry is important, and so is tea-packing in Assam.

**The Foreign Trade of India.**—India is surrounded by a wall of mountains, so that nearly all the foreign trade of India is sea-borne. The surplus produce of India and Burma is taken away by ocean steamers, and nearly all foreign manufactured goods are received in the same way. Most of the trade passes through the five main ports (Bombay, Calcutta, Karachi, Rangoon, and Madras).

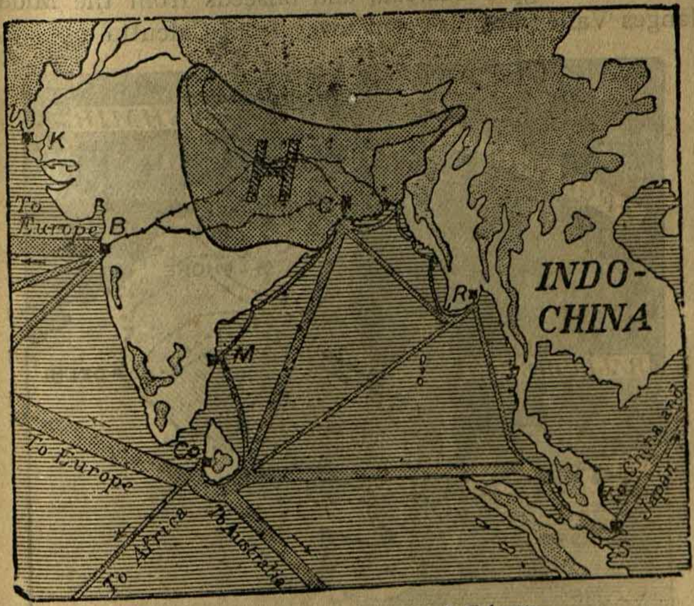


FIG. 121.—The Hinterland of Calcutta.

*The Hinterland and Exports of Bombay.*—Each of the great ports sends away the products of its hinterlands, so that the greatest export of Bombay is raw cotton. Bombay makes and exports a considerable quantity of cotton goods.

Fig. 120 shows the Hinterland of Bombay. Bombay is called the "Cotton Port" of India.

*The Hinterland and Exports of Calcutta.*—The most important crop in the Ganges Delta is rice, but Calcutta does not export any rice. It is all required to feed the great population. By far the most important export is jute—mainly raw jute, but also some manufactured into cloth and gunny bags. Large quantities of tea from Assam, lac from the Chota Nagpur Plateau, and oilseeds from the Middle Ganges Valley are also sent away from Calcutta.

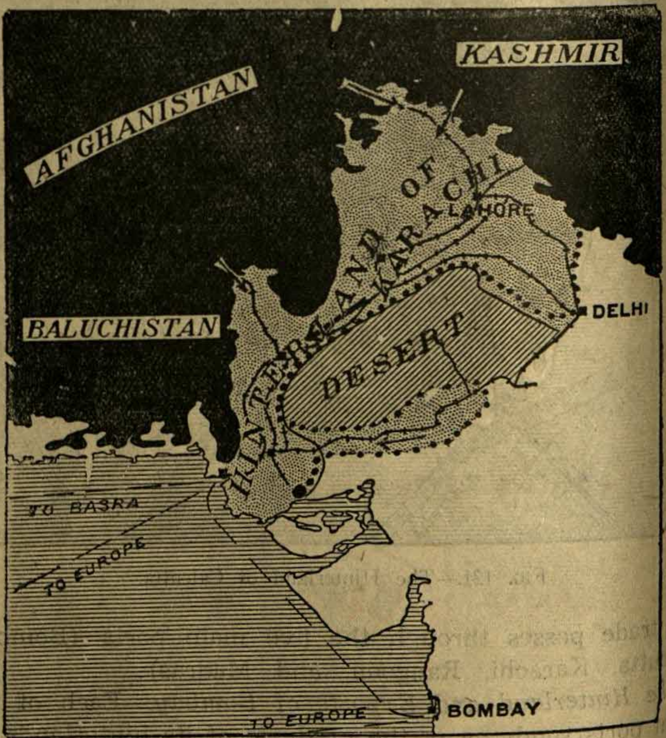


FIG. 122.—The Hinterland of Karachi.

*The Hinterland and Exports of Karachi.*—Karachi export the surplus cotton and wheat grown in the Punjab, as well as barley and oil-seeds. Karachi is called the " Wheat Port " of India.

*The Hinterland and Exports of Madras.*—The trade of Madras is small when compared with Bombay or Calcutta. It has a much less fertile hinterland. The leading export is leather.

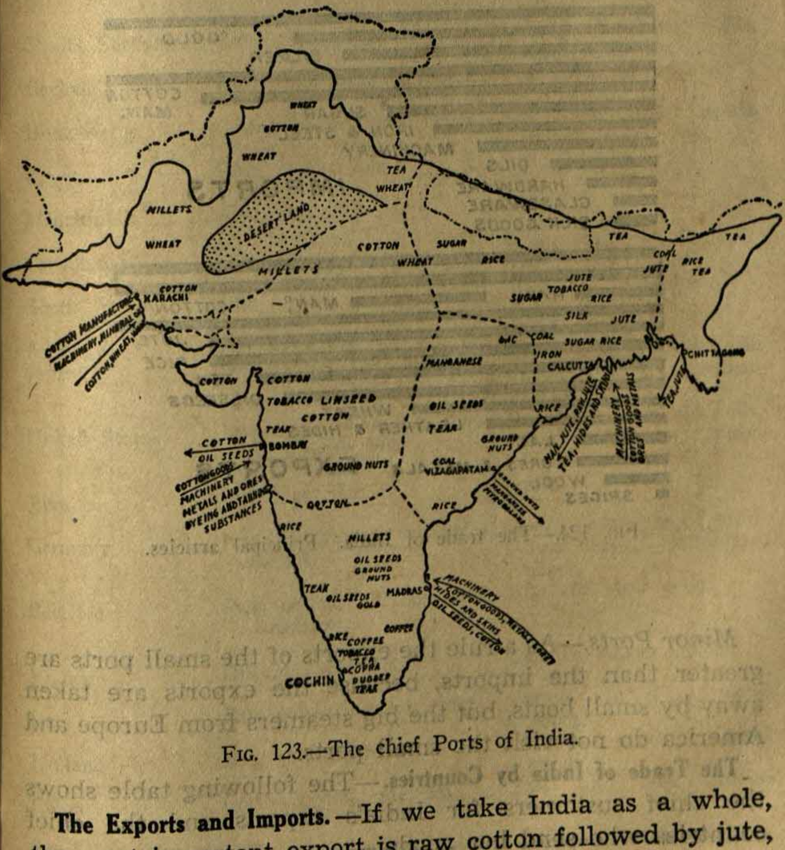


FIG. 123.—The chief Ports of India.

**The Exports and Imports.**—If we take India as a whole, the most important export is raw cotton followed by jute, rice, tea, oil-seeds, wheat, etc. These are raw materials and foodstuffs. The main imports, therefore, are manufactured goods. At all ports cotton goods take the leading place, followed by iron and steel goods and machinery. India does not grow nearly enough sugar-cane, and imports of sugar are important. It should be noticed that Bombay imports most of the gold and silver used in India. Recently, however, India has been exporting much gold and silver.

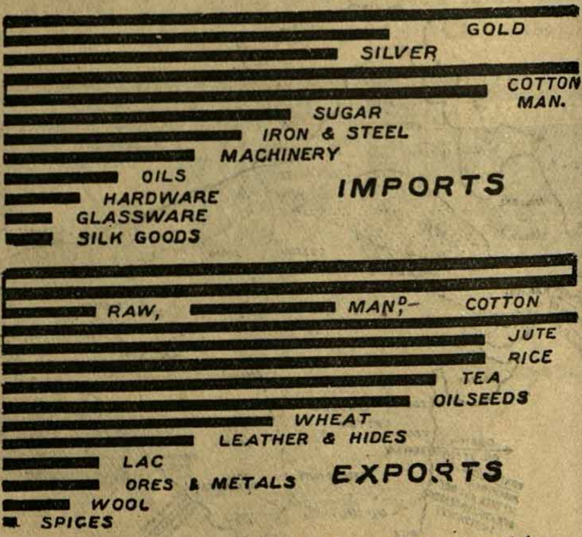


FIG. 124.—The trade of India. Principal articles.

*Minor Ports.*—As a rule the exports of the small ports are greater than the imports, because the exports are taken away by small boats, but the big steamers from Europe and America do not visit the small ports.

**The Trade of India by Countries.**—The following table shows the chief customers for India's exports and the chief countries who send her goods:—

### WHAT INDIA SELLS AND WHAT INDIA BUYS

### IN NORMAL TIMES

*(All parts of India)*

| Country | Things India Sells | Things India Buys |
|---|---|---|
| United Kingdom | Tea, jute, jute manufactures, oilseeds, food grains, hides and skins | Iron and steel goods, machinery, hardware railway engines, motor cars, cotton, liquors, paper. |
| Straits Settlements | Rice, cotton, jute | Spices, betelnuts, oils, sugar, silk, tin. |
| Ceylon | Rice, coal, cotton goods | Tea, copra, spices. |
| Hong-Kong | Cotton goods, jute, opium | Silk and silk goods, sugar. |
| Egypt | Rice, cotton, jute | Salt. |
| Mauritius | Rice, jute | Sugar. |
| Canada | Jute, tea | Motor cars. |
| South Africa | Jute | |
| Australia | Jute bags, tea | Wheat, Coal. |
| Japan | Raw cotton, rice, skins | Cotton goods, matches, silk goods, glassware, earthenware. |
| United States | Jute, cloth, hides and skins, lac, oilseeds, tea | Machinery, mineral oils, iron and steel, cotton goods. |
| Java | Jute bags, rice | Sugar. |
| Germany | Jute, rice, raw cotton, hides, oilseeds | Dyes, iron and steel, machinery, hardware, paper. |
| Belgium | Raw cotton, oilseeds, jute, manganese | Iron and steel goods. |
| France | Oilseeds, jute, cotton | Liquors, rubber goods. |
| Italy | Raw cotton, oilseeds, jute | Cotton goods, metal goods. |
| Holland | Lac, raw cotton | Cotton goods, metal goods. |
| China | Cotton goods, jute, tea | Silk and silk goods, tea. |
| South America | Jute | .... |

**Trade Routes.**—In Fig. 127 the principal world ports which have a large trade with India are marked by a square dot. Identify them on your atlas.

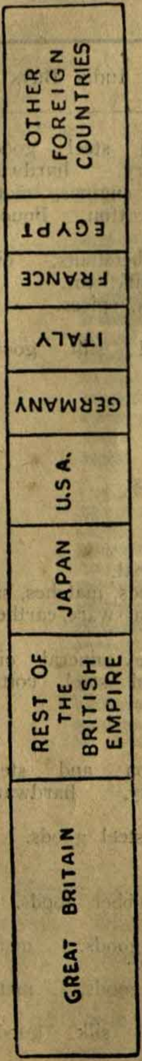


FIG. 126.—The trade of India by countries (exports).

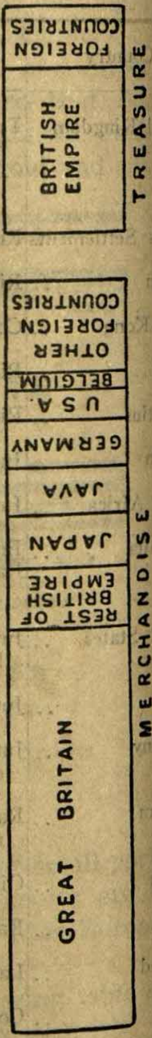


FIG. 125.—The trade of India by countries (imports).

*Shipping.*—A great proportion of the shipping which visits Indian ports is British or British Indian. Fig. 125 gives you some idea of the number of merchant ships visiting Indian ports from foreign countries in one year.

*The Overland Foreign Trade.*—Owing to the mountain wall the trade which passes over the land frontiers of India is very small and is with:

(*a*) Iran through Baluchistan. This trade has increased since the railway was continued through Baluchistan.

(*b*) Afghanistan, mainly through the Khyber Pass.

(c) Central Asia through Kashmir.

(*d*) Nepal.

(*e*) Tibet, especially through Darjeeling.
(*f*) China from Burma, especially *via* Bhamo.
(*g*) Siam from Burma.

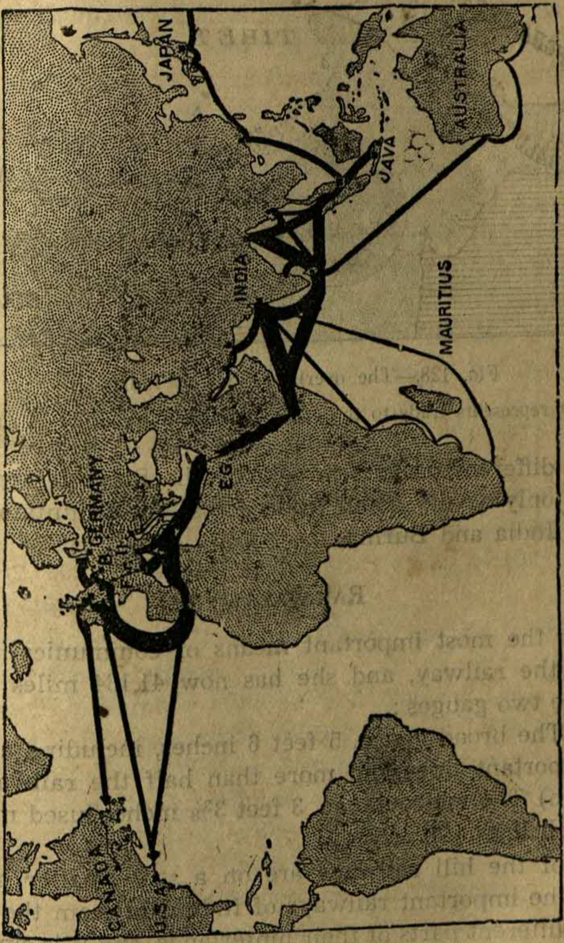


Fig. 127.—Trade routes from India.

Fig. 128 shows the overland trade of India with the various countries. It is only about 6 per cent. of the sea-borne trade. Most of the local trade between the various Provinces of India is by railway. In Burma the trade

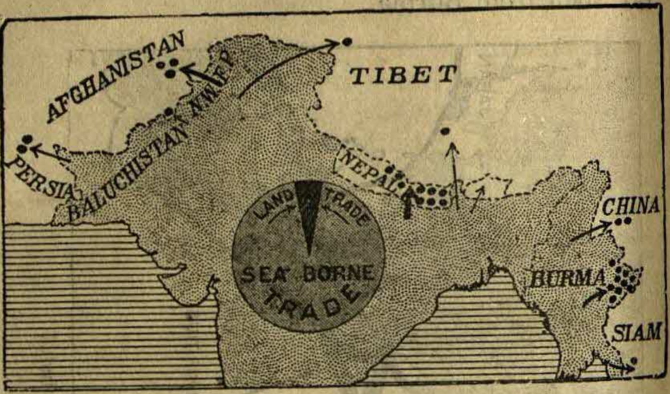


FIG. 128.—The overland trade of India.

Each dot represents trade to the value of roughly one crore of rupees.

between different parts is largely by the River Irrawaddy. There is only a very small trade across the mountain wal between India and Burma.

## RAILWAYS

By far the most important means of communication i India is the railway, and she has now 41,134 miles of it There are two gauges :

(*a*) The broad gauge, 5 feet 6 inches, including all th more important lines and more than half the railways o India. (b) The metre gauge, 3 feet 3⅜ inches, used mainl for branch lines.

Some of the hill railways are on a still smaller gaug Most of the important railways of India run from the chie ports to different parts of their hinterlands, and it is simple to study the railways by taking each of the great ports i turn.

*Railways serving Calcutta.*—There are four main railways diating from Calcutta and Howrah.

(*a*) The Eastern Bengal Railway (E.B.R.) runs to the rth to Darjeeling and north-east (Assam). At Sara there a bridge across the Ganges, but in other places the railway interrupted by the broad stream of the Ganges or Brahmatra. A small line runs from Assam to the port of hittagong (the Assam-Bengal Railway).

(*b*) The East Indian Railway (E.I.R.) runs from Howrah the Ganges Valley to Benares (here is the first railway idge across the Ganges; there is no railway bridge tween Sara and Benares over the Ganges), Delhi, and the unjab.

(c) The Bengal-Nagpur Railway (B.N.R.) runs from owrah right across the Plateau to Nagpur and is continued Bombay.

(*d*) The Bengal-Nagpur Railway also runs from Howrah Vizagapatam down the east coast.

In the Ganges Valley there is a network of metre-gauge ilways north of the river (Bengal and North-Western ailway, etc.), but most of the lines south of the river are road gauge.

*Railways serving Bombay.*—There are four main lines diating from Bombay.

(*a*) The Bombay, Baroda and Central India Railway B.B. & C.I.R.) goes north to Baroda and Delhi.

(*b*) The Great Indian Peninsular Railway (G.I.P.R.) oes north-east to Jubbulpore, where it joins the E.I.R. and uns on to Allahabad, where it joins the Bengal-Nagpur ailway to Calcutta (Howrah).

(c) The G.I.P.R. also goes east to Nagpur.

(*d*) The G.I.P.R. has another main line going southastwards to Raichur, where it joins the M. & S. M. R. o Madras.

All these lines are broad-gauge lines.

*Railways serving Karachi.*—Karachi really has only one railway, the North-Western Railway, which runs to Hyderabad. From Hyderabad there are two main lines, one to Delhi, the other up the Indus Valley to the Punjab. The N.W.R. has a network of lines in the Punjab and a branch to Baluchistan.

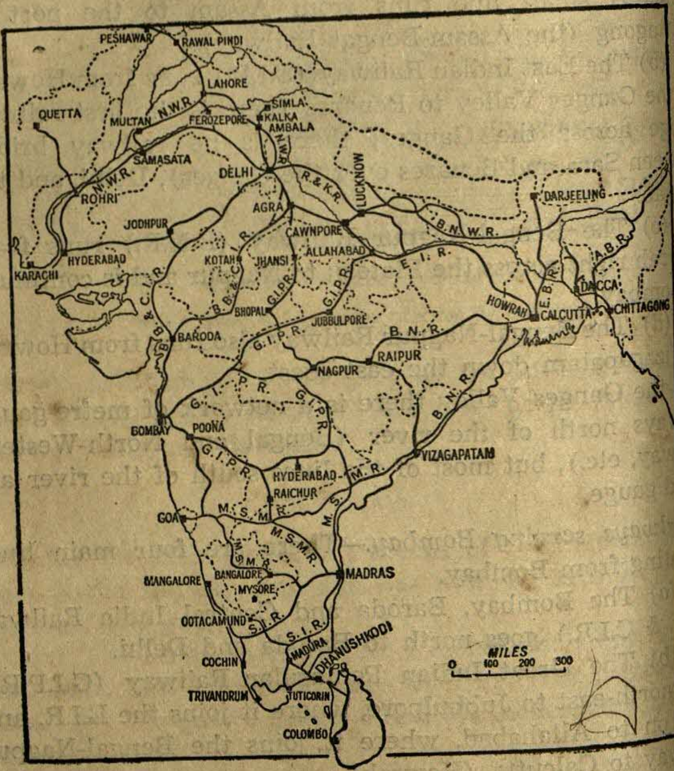


FIG. 129.—Railway map of India.

*Railways serving Madras.*—Four main lines radiate fro Madras:

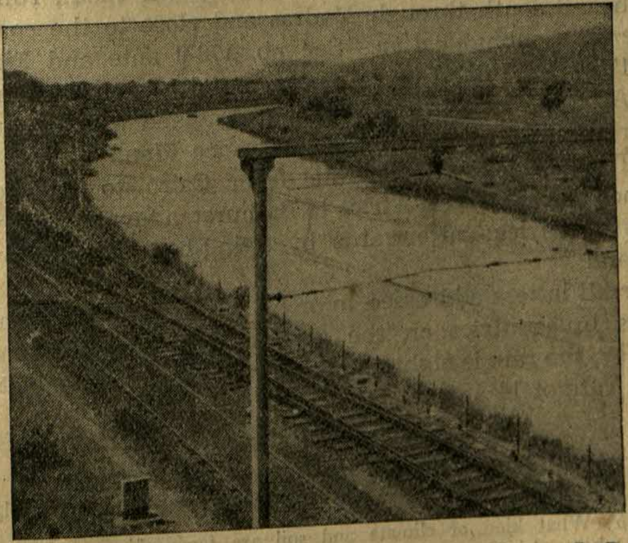
(*a*) The Madras and Southern Mahratta Railway ru northward to Vizagapatam and joins the B.N.R. to Calcutta

(*b*) The M. & S. M. R. also runs north-westwards
Raichur and joins the G.I.P.R. to Bombay. There is also
branch to the Portuguese territory of Goa.

(*c*) The South Indian Railway runs westwards throug
the Palghat Gap, to the west coast.

(*d*) The S.I.R. (metre-gauge main line) runs sout
wards to Dhanushkodi (the mail port for Ceylon), Tuticori
and Trivandrum.

Apart from these main lines shown, there are lar
numbers of branch lines in all the more thickly populat
parts of India. Remember there is at present no railw
connecting India and Burma, and no railway connecti
India with any other country.



(*Photo*: *G. B. N*

FIG. 130.—Railway following a River Valley.

*Roads.*—When compared with other civilised countr
India has very few metalled roads. There are a few " tr

roads," such as the one from Calcutta to Peshawar, which were commenced before the days of railways, but often even the trunk roads are badly in need of repair. Most of the metalled roads of India are found round the larger towns, or acting as "feders" to the railway—that is, goods are brought along the roads to the nearest railway station.

*Rivers.*—It has already been explained that the rivers are much less important than formerly owing to the growth of the railways and the use of river water for irrigation. The largest system of river transport is found on the River Ganges and branches below Patna. Except for the Calcutta and Eastern Canals, the canals of India are little used for transport; they are for irrigation. Note, however, the Buckingham Canal, a saltwater navigation canal, running north and south through Madras and close to the coast.

*Aerial Communication.*—See pp. 178-9 ante and Fig. 87 pp. 176-7 for Inland and Foreign aerial communications.

As a war measure Air Mails to England will be carried according to the following New Service Plan:—

The service will operate from Cairo to Khartoum. Thence across Central Africa to Bathurst, a town on the west coast of Africa; afterwards by flying-boat *via* Lisbon to England.

For all letters addressed to or by members of the fighting forces in countries on the air-mail route from Cairo to Sydney, the rate is eight annas per half ounce, as against the usual rate of 14 annas.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate your answers by diagrams, sketches, etc.

1. (*a*) Draw a map of India and show on it areas producing coal, tea, wheat and rice.

(*b*) What kind of climate and soil are favourable to the growth of tea, wheat and rice. (B. U. 1933)

2. Draw an outline map of India and show on it the following:—

(*a*) Railway routes from Bombay to Calcutta and to Madras with two towns on each route.

(*b*) Routes of air services with places of intermediate stops. (B. U. 1932 & 35)

3. Name those parts of India (*a*) most thickly populated, (*b*) most thinly populated.

How do you account for this difference in population? (B. U. 1935)

*Or*

Draw a map of India and show on it the following:—

(*a*) Thickly populated areas.
(*b*) Thinly populated areas.
(*c*) Any ten cities with a population of more than a lakh. (B. U. 1931)

4. Account for the following:—

(*a*) Tea is exported from India.
(*b*) Jute is exported from India.
(*c*) India imports machinery. (B. U. 1934)

5. Which countries import tea, jute and manganese from India? Which countries export cotton goods, sugar, kerosene oil and machinery to India? Name the chief Indian ports through which these articles pass. (B. U. 1935)

*Or*

Name any five raw products that are exported from this country to be manufactured into finished goods. Name the principal countries to which each is exported; and mention the form in which it returns to this country as a finished product. (B. U. 1928)

6. Name the chief industries of India and mention their centres. Explain clearly why India is industrially backward as compared with England. (B. U. 1935)

7. Draw a map of India and show thereon how Bombay, Karachi, Quetta, Peshawar, Calcutta and Madras are connected by rail with Delhi. (B. U. 1929)

8. (*a*) Why is there no railway connection between India and Burma?

(*b*) What are the possible routes for the Indo-Burman railway? (B. U. 1919)

9. Describe a journey by rail from Bombay to Delhi referring to the physical features and commercial importance of the places passed through. (B. U. 1919)

*Or*

Describe a journey by rail from Bombay to Karachi with special reference to the physical features and commercial importance of the lands passed through. (B. U. 1924)

10. Describe the journey by land from Madras to Peshawar mentioning the physical features, climate, crops and industries of the land along your route. (B. U. 1933)

*Or*

Describe a journey by land (or by sea) between any two of the following places:—

Bombay, Ahmedabad, Karachi, Shikarpur, Poona, Jalgaon, Dharwar, Karwar. (B. U. 1928)

# CHAPTER XXI

## STATES, PROVINCES AND TOWNS

India under the British was ruled by the Viceroy and Governor-General from New Delhi from 1912 before which the capital was Calcutta. The Viceroy was assisted by an executive council. Most of the country's laws were made in the Legislative Assembly and the Council of State. For administrative purposes the country was divided into eleven major provinces each under a Governor (Madras, Bombay, Bengal, the United Provinces, the Punjab, Sind, Bihar, Orissa, Assam, the North-West Frontier Province and the Central Provinces and Berar) and six minor provinces each under a Chief Commissioner (Ajmer-Marwara, Delhi, Coorg, British Baluchisthan, the Andaman and Nicobar Islands and Panth-Piploda in Rajputana). Besides these there were large areas, called Native States, which were ruled by their own chiefs (Maharajahs, Rajahs, Nawabs etc.,) under the directions of the Viceroy.

On August 15, 1947 the British Government transferred their power to the Indians themselves and created the Dominions of India and Pakistan corresponding to the Hindu and Muslim majority areas of the country. The Punjab and Bengal were partitioned on a communal basis. Sind, Baluchisthan, N.W.F.P., the West Punjab, East Bengal (on the basis of a plebiscite) and the Sylhet district of Assam went to form Pakistan. The rest of British India became the Indian Dominion. Directive authority over the

Native States was withdrawn and the chiefs were left free to enter into treaty relationship with either dominion. States like Baroda, Mysore etc., became integrated with India and Bhawalpore, Kalat, Chitral etc., acceded to Pakistan.

The Constituent Assembly of India drew up a constitution on the basis of which the country became a Democratic Republic on January 26, 1950, with a President at its head. The President rules the country with the help of a Council of Ministers. Legislative power is vested in the Indian Parliament. For administrative purposes the country is divided into nine states under Governors (Assam, W. Bengal, Bihar, Bombay, Madhya Pradesh, Madras, Orissa, Punjab, United Provinces), nine states under Rajpramukhs (Hyderabad, Kashmir, Madhya Bharat, Mysore, Patiala and East Punjab States Union, Rajasthan, Saurashtra, Travancore-Cochin and Vindhya Pradesh) and a number of states under Chief Commissioners (Ajmer, Bhopal, Bilaspur, Coorg, Delhi, Himachal Pradesh, Kutch, Manipur, Tripura and the Andaman and Nicobar Islands). India's capital is Delhi.

Along with India, Pakistan is a member of the British Commonwealth of Nations. Her constitution has not yet been drawn up and she is still a Dominion ruled by a Governor-General who is appointed by H. M. the King of Britain and who rules with the help of a Council of Ministers. Her capital city is Karachi.

Quite separate in Government is Ceylon, which is an island off the south of India and only separated from it by a narrow strait. Ceylon has its own Parliament and is also a self-governing member of the British Commonwealth of Nations.

### (a) THE MOUNTAIN WALL

The mountain wall, which bounds India and Pakistan on the north and west, lies in a number of different States and Provinces. Baluchistan and Kashmir belong almost entirely to the mountain belt, and so does the independent kingdom

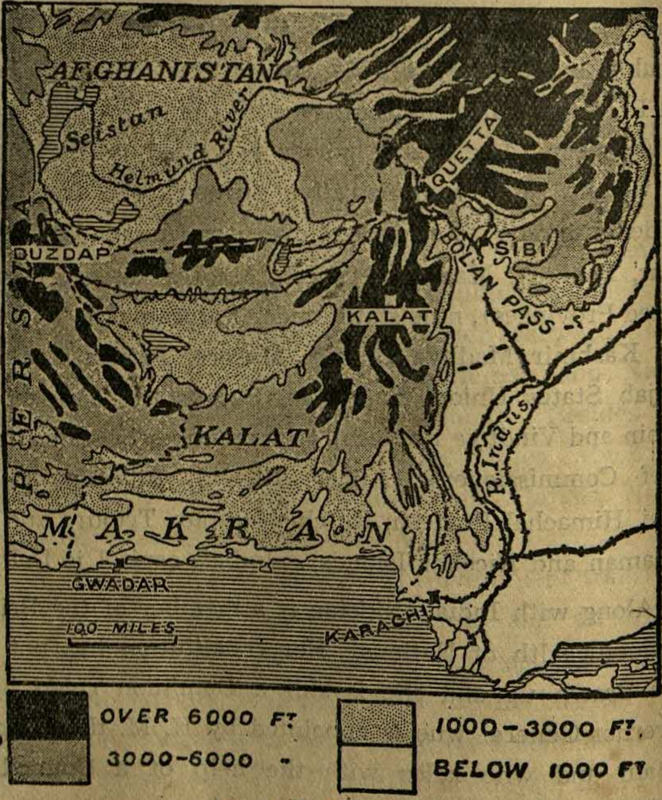


FIG. 131.—Baluchistan.

of Nepal. The North-West Province is mainly a mountain province. We will describe now the principal mountain States, Baluchistan, the North-West Frontier Province, Kashmir and Nepal.

**Baluchistan.**—Baluchistan lies outside the mountain belt of India and outside the influence of the monsoon. It is a very dry plateau, averaging 1,000 to 3,000 feet high, and includes some Pakistani districts in the most fertile parts, the large Pakistani State of Kalat, and a number of smaller States. The whole is cut off from India proper by the Sulaiman Range. The rainfall in Baluchistan does not usually exceed eight inches in a year. There are no large rivers which can be used for irrigation, and the rainfall is mainly during the storms of the cold season. It is very hot in the hot season and very cold during the cold season. Except near the coast the rivers flow into shallow lakes which often dry up entirely in the hot weather. In this barren country there are very few people, only six per square mile. They are nearly all nomads, of three races Brahui, Biluchi, and Pathani—wandering about with their herds of sheep, goats, horses, cattle and camels. In summer they live in shelters made of branches or in tents made of goat's hair. In winter they live in mud huts in villages. There are no large towns in Baluchistan and the Bolan Pass is the easiest route to India, and the Pakistani town of *Quetta* lies at the head of the Pass. Another Pakistani station is *Sibi*.

**The North-West Frontier Province.**—The North-West Frontier Province is one of the smaller provinces of Pakistan and lies mainly between the Punjab and the Afghan frontier on the western side of the Indus. It consists of three Pakistani districts and a large tract of tribal territory lying between them and the frontier. This tribal territory is inhabited by wild hill tribes who are left to themselves, unless they become restless and threaten the people of the plain. The Province really consists of three plains—Peshawar, Bannu and Dera Ismail Khan—divided from one another by low hills. By far the most important part of the Province is the

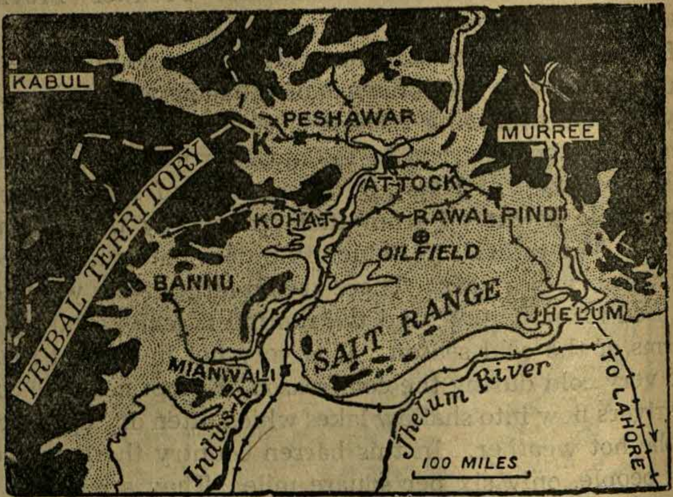


FIG. 132.—The North-Western Hills Region.

Vale of Peshawar, irrigated and well wooded. The hills are barren and treeless, for the rainfall is in winter and is scanty. Above the important town of *Peshawar* lies the famous Khyber Pass, the great road to Afghanistan; a wonderful mountain railway now takes its way through the narrow Pass.

**Kashmir.**—Kashmir is a large State, situated amongst the mountains of north-western India. It is ruled by the Rajpramukh with a council of ministers; the capital is at *Srinagar*. In Kashmir the broad complex Himalayas, comprise four ranges—the Muztagh-Karakoram range, the Inner Himalayas, the Middle Himalayas and the Outer Himalayas. In the Muztagh range is Mt. $K_2$, probably the second highest mountain in the whole world. This chain of mountains completely cuts off the bleak Tibetan plateau which lies beyond, and it is only with great difficulty that the ranges can be crossed.

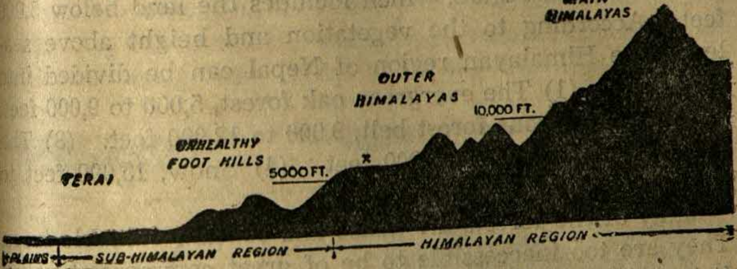


FIG. 133.—Section through the Himalayas.

The greater part of Kashmir is mountainous with very little land that can be utilized, and is inhabited by few people. The most important part of the State is the small Vale of Kashmir, one of the most beautiful valleys in the world.

**Nepal.**—Although Nepal is a kingdom quite independent of India, it is considered here because it lies to the north of the Ganges plain and is, from its geography, closely connected with India. The ruling race in Nepal is the race of the Gurkhas, fine brave men who make very good soldiers.

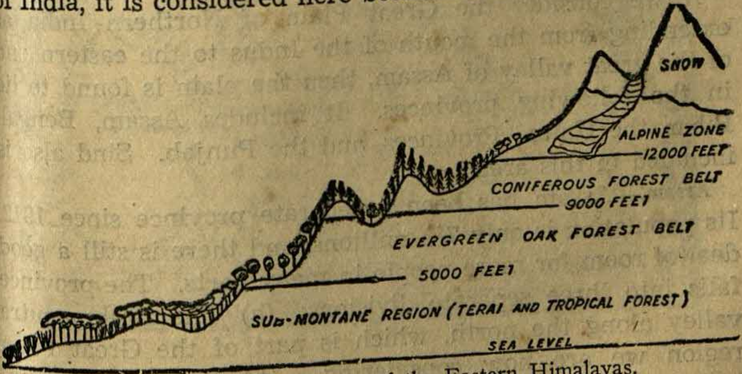


FIG. 134.—Vegetation zone of the Eastern Himalayas.

Nepal can be divided into two regions, the Himalayan region which includes all the land above 5,000 feet, and the sub-Himalayan region, which includes the land below 5,000 feet. According to the vegetation and height above sea-level, the Himalayan region of Nepal can be divided into four belts. (1) The evergreen oak forest, 5,000 to 9,000 feet. (2) The coniferous forest belt, 9,000 to 12,000 feet. (3) The Alpine belt, 12,000 to 15,000 feet. (4) Snow, 15,000 feet to the top of the mountain.

Many of the forests are dense and contain valuable trees. They are too inaccessible to be of great commercial value. It is difficult to get into the mountains and still more difficult to work the timber. The Sub-Himalayan region lies between the broad cultivated plain of the Ganges and the Himalayan region. The principal town of Nepal, *Katmandu*, is situated in a rich valley amongst the hills; and nearly a quarter of all the inhabitants of Nepal live in this valley.

### (b) THE GREAT PLAIN

If we consider the Great Plain of Northern India as extending from the mouth of the Indus to the eastern end of the great valley of Assam, then the plain is found to lie in the following provinces. It includes Assam, Bengal, Bihar, the United Provinces, and the Punjab. Sind also is included in this area.

**Assam.**—Assam has been a separate province since 1912. Its population is only 7½ millions, and there is still a good deal of room for more people in many parts. The province falls into three separate divisions: (*a*) The Brahmaputra valley along the north, which is part of the Great Plain region we are now considering. (*b*) The hills region, including the hills on the eastern border and a large finger of hills extending westwards. (c) The Surma valley in the south which joins on to and forms part of the great delta region of Bengal. The Brahmaputra-Assam valley is oughly 500 miles long, and only about 50 miles wide, very ifferent from the broad Ganges plain. It is shut in between he lofty Himalayas on the north and the Assam hills on the outh. A great part of the valley has a rainfall of more than 0 inches, though the centre is drier. The Brahmaputra

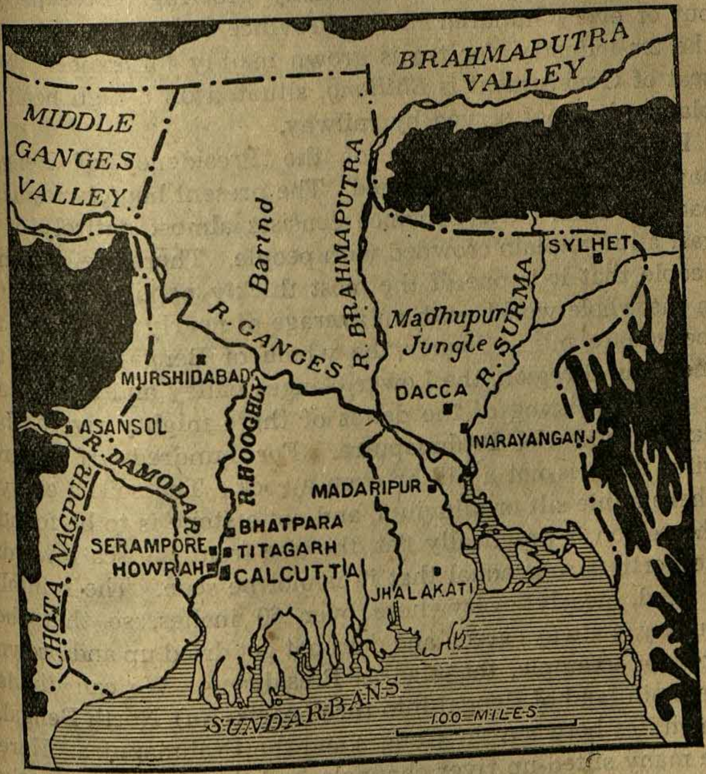


Fig. 135.—Eastern Plains.

river itself is broad; it divdes and reunites again many times. On either side there are often waste, marshy tracts. A little distance from the river are flat lands given over to rice-growing. Palm trees and villages are dotted about amongst the paddy fields; and further away from the river are found the gentle slopes covered with tea-gardens for which Assam is famous. Every year people come from crowded Bengal to settle in the valley, while Biharis are employed in the tea-gardens and afterwards settle on the land; so the population is steadily growing. Five people out of every hundred in the Province are connected with the tea-industry, for tea is grown mainly for export. The seat of Government is *Shillong*, situated on a high healthy plateau but not served by railway.

**Bengal.**—The boundaries of the Presidency of Bengal have been frequently changed. The present boundaries date back to 1912. The Province consists almost entirely of a vast alluvial plain crowded with people. There are so many people that it is one of the most thickly populated regions in the whole world, with an average of nearly 600 people to the square mile. Nearly the whole of Bengal belongs to one natural region, the Lower Ganges valley and the Deltas region, consisting of the deltas of those mighty rivers, the Ganges and the Brahmaputra. For hundreds of square miles there is not a hill or even a rock. The soil is everywhere a fine silt or alluvium, and not a stone is to be found. The region is practically flat, the rise from the sea towards the north is so gradual that it cannot be seen. The rainfall is good, nearly everywhere over 60 inches, so that the country is always green and does not get dried up and brown like, for example, the Madras Presidency. We can divide the plain land of Bengal into three parts. (*a*) North Bengal, which lies between the Ganges and the Brahmaputra. Here are many silted-up river channels, and the rivers frequently change their courses. (*b*) The old delta of central and western Bengal. This is now a land of dead and dying rivers, and the water from the Ganges no longer flows through the river channels, and they are rapidly becoming large swamps. Some of them have actually been drained nd form fine rice-land. Near the sea are the Sundarbans, reat swamp forests. (c) The new delta of eastern Bengal.

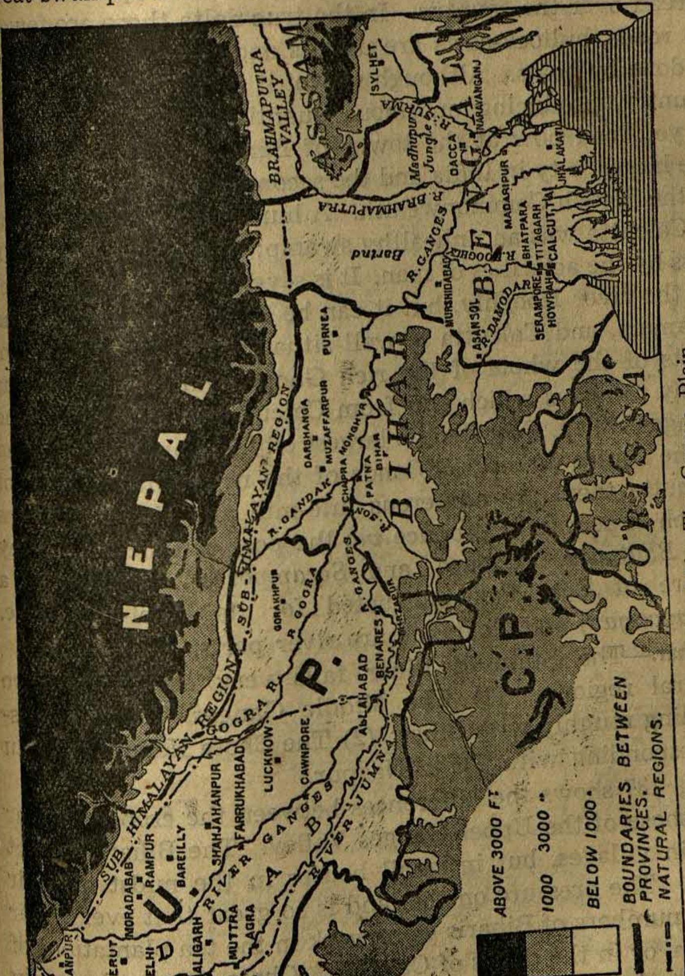


FIG. 136.—The Ganges Plain.

Here the great rivers are still building up their deltas, and every year huge quantities of silt are brought down by the

Ganges and the Brahmaputra. In the highwater season a great part of the area is flooded, and a rich deposit of silt is spread over the country. In the true delta there are few or no roads, bullock-carts are useless and nearly all travelling is done by boats. Although so wet it is a densely populated country, producing enormous quantities of rice and jute. If you look now at the towns of Bengal there is *Calcutta*, the largest city in India and the second largest after London, in the British Commonwealth. A hundred years ago the site of Calcutta was an unhealthy swamp; it has grown to greatness by the activities of man. It is seventy miles from the sea up the river Hooghly, but it can be reached by large ocean steamers, and Calcutta is well situated to receive the products of the whole of the rich Ganges valley. Notice the many railways which run from Calcutta to all parts of the Ganges valley. *Dacca* is the largest city in East Pakistan and is the centre of the rich lands of the new delta. North of Calcutta there are numerous jute-mill and rice-mill towns which export their produce *via* the port of Calcutta. They are *Bhatpara*, *Titagarh*, and *Serampore*. *Jhalakati* is a centre of East Pakistan noted for its betel-nut trade. *Narayanganj* and *Goalundo* are river ports.

**Bihar.**—The State of Bihar falls very easily into two natural regions. (1) The Middle Ganges Valley corresponding roughly with Bihar; (2) The Chota Nagpur Plateau corresponding with Chota Nagpur.

Fig. 137 shows the differences between the crops of Bihar and those of the Upper Ganges Valley. The Biharis do not live in villages, but in small houses in the midst of their fields. The pressure on the land is so great that every year large numbers of Biharis go to work in the tea plantations of Assam, or in the docks of Calcutta. Chota Nagpur is deeply cut into by the river Mahanadi and its tributaries. Everywhere the rainfall is good, and the plateau is forested. There are splendid forests of valuable sal trees. On the flatter parts of the plateau are broad grassy areas. The plateau is largely occupied by native states. It is thinly populated and includes some of the wildest parts of India. In the depths

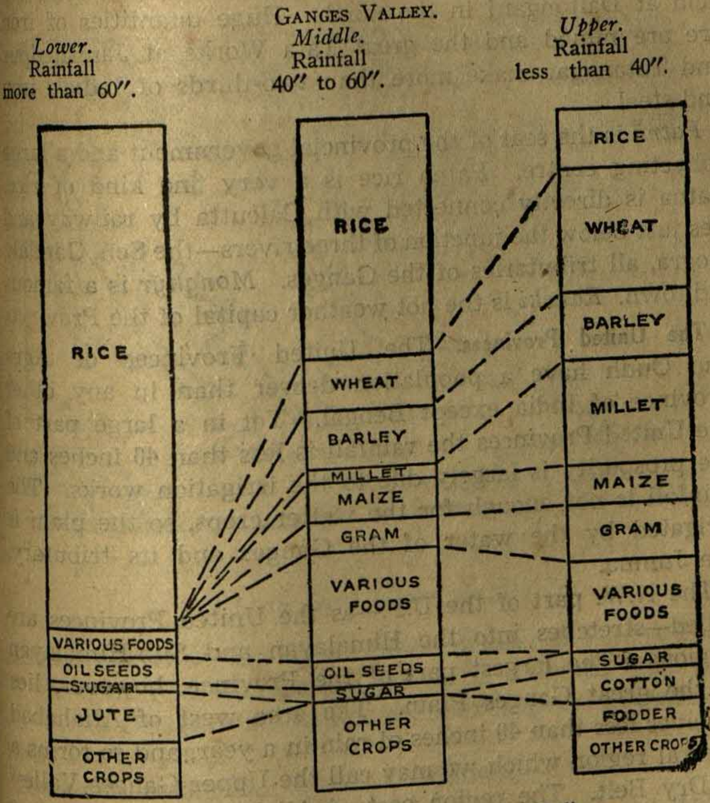


FIG. 137.—The crops of the Ganges Valley.
The three main natural regions compared.

of the forests are primitive tribes, such as the Santhals, who still use bows and arrows and wear no clothes. An important industry is the collection of lac from the trees. Rice is an important food crop. In the north there are mica mines.

On the borders of Bihar and Bengal the most important coalfields of India are found. The coalfields of Jherria, Raniganj, and Giridih produce about 17,000,000 tons a year, or nine-tenths of all the coal of India. There is a smaller field at Daltonganj in the north. Huge quantities of iron ore are mined and the great Tata Works at Jamshedpur and Tatanagar make more than two-thirds of India's iron and steel.

*Patna* is the seat of the provincial government and a large collecting centre. Patna rice is a very fine kind of rice. Patna is directly connected with Calcutta by railway and lies just below the junction of three rivers—the Son, Gandak, Gogra, all tributaries of the Ganges. *Monghyr* is a famous old town. *Ranchi* is the hot weather capital of the Province.

**The United Provinces.**—The United Provinces of Agra and Oudh have a population denser than in any other province of India except Bengal. Yet in a large part of the United Provinces the rainfall is less than 40 inches and the prosperity is largely due to the irrigation works. The rainfall is not enough for the wetter crops, so the plain is irrigated by the water of the Ganges and its tributary, the Jumna.

The N.W. part of the U.P.—as the United Provinces are called—stretches into the Himalayan and Sub-Himalayan Regions. The largest part of the Province, however, lies in the great Ganges Plain. The area west of Allahabad receives less than 40 inches of rain in a year, and so forms a natural region which we may call the Upper Ganges Valley or Dry Belt. The region east of Allahabad forms half of the Middle Ganges Valley. The Upper Ganges Valley is a vast plain without a hill. Running roughly through the centre from north-west to south-east is the Ganges; marking roughly its south-western border is the Jumna. The region consists therefore of the Ganges-Jumna Doab. The whole plain slopes very gently from Delhi (700 feet above the ea) to Allahabad (400 feet). The plains are cold in the old season, but get very hot in the hot weather. Since the ainfall is nearly everywhere less than 40 inches, it is ecessary to irrigate the land. The Ganges-Jumna Doab is

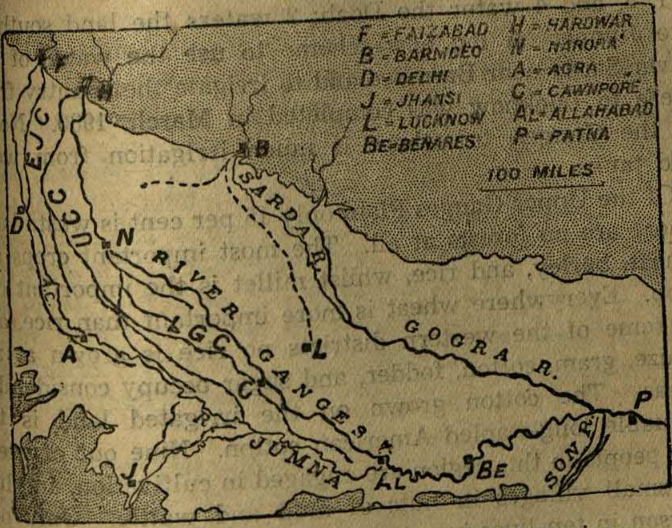


FIG. 138.—The irrigation canals of the United Provinces. The Sarda Canal is now complete.

especially well served by irrigation canals, and more than 50 per cent. of the crops are grown on irrigated land. In the Upper Ganges Valley there are four large canal systems. Look at Fig. 138.

You will notice four canals as follows:—

(1) The Eastern Jumna Canal, which takes the water from the Jumna River near Faizabad, just where the river leaves the mountains.

(2) The Agra Canal, which takes the water from the Jumna River just below Delhi.

(3) The Upper Ganges Canal, which takes the water

from the Ganges near Hardwar, where it comes down from the Himalaya Mountains.

(4) The Lower Ganges Canal, which takes the water from the River Ganges at Narora.

1, 3, and 4 water the Doab; 2 waters the land south of the Jumna. A big new scheme to use the water of the River Sarda near Barmdeo and to irrigate the country from there to Lucknow was completed in March, 1930. North of the Ganges, too, there is much irrigation from wells and tanks.

Of the Upper Ganges Plain only 15 per cent is waste land. There are no forests at all. The most important crops are wheat, barley, and rice, whilst millet is the important dry crop. Everywhere wheat is more important than rice, and in some of the western districts no rice is grown at all. Maize, gram, cotton, fodder, and sugar occupy considerable areas. The cotton grown on the irrigated land is the valuable long-stapled American cotton. Nine out of every ten people in this region are engaged in cultivation, and live in small villages in huts of mud and wattle. Only one person in ten lives in a town. Although the Upper Ganges Valley is so densely populated, there are only fourteen cities with more than 50,000 people. Of the famous old towns Lucknow, Allahabad, and Muttra are now the most important. *Lucknow* is an old capital and the largest town in the province. It is a railway centre. *Allahabad*, situated at the junction of the Jumna and Ganges, is an important place of pilgrimage. Now that railways have supplanted river routes, it has become a great railway junction and a collecting centre. *Muttra* is an old religious centre.

Of the more modern and progressive cities there are:—

*Cawnpore*, collecting centre and railway junction with numerous manufactures of its own. *Meerut*, *Bareilly*, and *Aligarh* are important among the growing cities. *Mussoori* and *Naini Tal* are hill stations; *Dehra Dun* is one of th eadquarters of the Forest Department in India. Then here is a famous and sacred place *Hardwar,* where the anges leaves the mountains. *Agra,* on the Jumna, is amous for its dream in marble, The Taj Mahal, one of the reat wonders of the world. *Benares* with its temples is he most sacred city of the Hindus; a great seat of Hindu ulture, it stands on the Ganges. It is famous for its silk, loth and jewellery.

**The Punjab.**—Punjab means "five waters" and the Punjab is strictly the land of the five rivers—the Jhelum, Chenab, Ravi, Bias, and Sutlej. But the province extends beyond this area and includes the land between the Jhelum and the Indus, as well as part of the Himalayas. The whole is larger than the United Provinces and nearly as large as the Madras Presidency. The population is roughly 28,50,000. The important Indian States are those of Patiala, Jind, and Nabha.

The greater part includes the plain of Hindustan. In the north-west is a dry plateau or hilly region. The north-eastern part includes portions of the Himalayan and Sub-Himalayan Regions, whilst the south-east borders the Thar Desert. In the North-Western Dry Hills Region between the Jhelum and the Indus the most important crop is millet, which depends mainly on the scanty rainfall. There is an oil-field near Attock, and salt is mined in the Salt Range. Efforts have been made to work the fine timbers of the Himalayas. The most valuable trees are the deodar and the blue pine. The chir pine is also used. The timber is floated down to saw-mills on the plains.

The Punjab Plain is a broad alluvial plain without a hill at all. It slopes almost imperceptibly south-westwards. Five rivers thread their way across the plain—the Jhelum, Chenab, Ravi, Bias, and Sutlej. Eventually they all join to form the Panchnad, which in turn joins the Indus. In the dry season the rivers are shallow and slow, but in the rainy season, when the warm sun has melted the snows on the

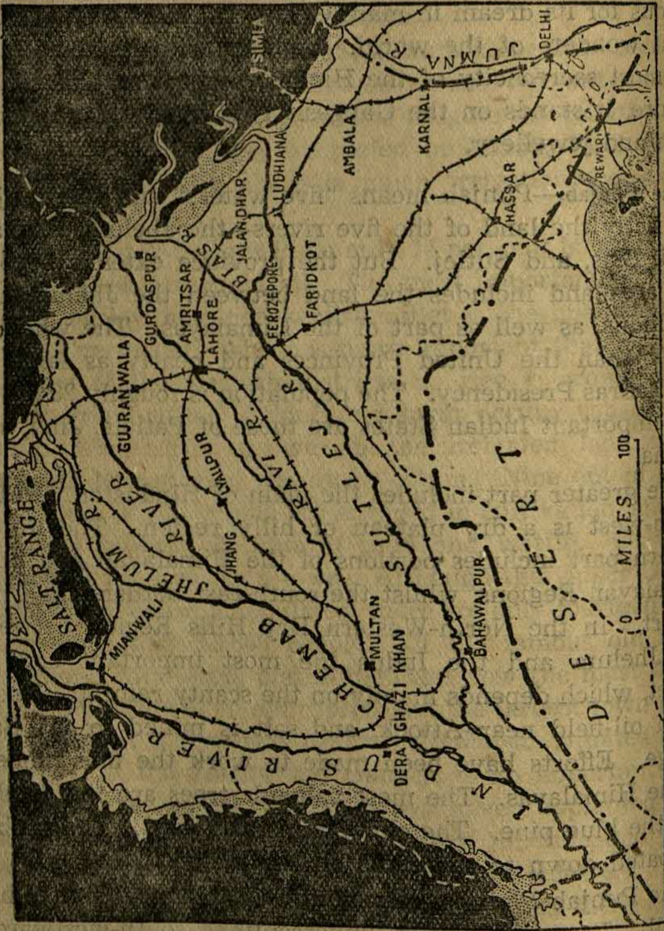


FIG. 139.—The Punjab Plains.

Himalayas and the monsoon rains are pouring down on the Himalayan slopes, the rivers become rushing torrents, often miles wide. The rush of water does not always follow the same channel. The river may leave its old bed and in a single night destroy miles of fertile fields. The whole region is very dry; it is driest in the south-west, where the rainfall is less than 5 inches. The extremes of temperature between the hottest and coldest months should be noted. There is the wettest part—near the foot of the Himalayas with numerous wells for irrigation, but dry crops may also be grown without irrigation.

In the South-Eastern Plain the rainfall is usually from 20 to 30 inches but varies greatly from year to year. In good rainfall years dry crops can be grown; in bad years none. More than half the crops depend upon irrigation. There are six important systems of Government Canals.

(1) The Western Jumna Canal takes its water from the River Jumna near where it leaves the mountains and waters the south-east of the plain.

(2) The Sirhind Canal is an old system taking its water from the Sutlej River and also watering the south-eastern plain.

(3) The Upper Bari Doab Canal takes its water from the Ravi River, where the Ravi leaves the mountains.

(4) The Lower Chenab Canal is one of the largest of the irrigation works in India. A great weir was built across the River Chenab at Khanki.

(5) The Lower Jhelum Canal takes its water from the Jhelum.

(6) The Triple Project or Upper Chenab-Lower Bari Doab Canal System is one of the cleverest examples of canal irrigation that exists. The Upper Chenab Canal takes its water from the Chenab at Merala near the foot of the Himalayas. The main canal is carried across the Ravi River by an aqueduct or "water bridge" and then becomes the Lower Bari Doab Canal. But when this scheme was arranged it was found that so much water would be taken by the Upper Chenab Canal that none would be left for the Lower Chenab

Canal, so the Upper Jhelum Canal was built to bring water from the Jhelum to the Chenab at Khanki to fill the Lower Chenab Canal. As a result of irrigation many parts of the Punjab are "double cropped." Wheat, the most important crop, covers nearly a third of the area. It is reaped in spring; millet is often grown on the same ground and reaped in autumn. Wheat and millet, together with maize, form the staple food of the people. An excess of wheat is available for export and is sent to Europe through the port of Karachi. Another crop is barley. Oil seeds are grown mainly for export. By far the most important crop not grown for food is cotton. On the irrigated land the long-stapled American cotton is grown and exported through Karachi. The Punjab being a dry region, much fodder is grown to feed the cattle used in ploughing.

The majority of the people are engaged in agriculture. In the old days the cultivators suffered severely from the raids of warlike tribes from the hills, and so lived together in villages for protection. They still live together in small villages scattered over the plains. The huts are of mud or mud and wattle, and the roofs of the huts are flat, for there is little rain to run off. There are only a few towns.

*Lahore* is an old historic city and is the capital of Punjab (Pak). *Jullunder* is the capital of Indian Punjab. It forms one of the collecting centres for the rich northern parts of the plain. *Amritsar* is another centre nearby. It is the holy city of the Sikhs and a busy trading town and manufactures carpets. It suffers, however, very badly from fever. *Multan* is the natural centre of the dry south-western plain. Much of the trade to Karachi passes through Multan, which has long been a busy market town. Afghan traders visit the town and exchange their raw salt, spices and fruits for piece-goods. *Gujranwala* and *Ludhiana* (with cotton mills) are other centres in the northern part of the plain, whilst *Hissar* and *Jind* are in the south-east. *Lyallpur* is a fine new town with a large wheat trade, the wheat being collected and sent to Karachi. It has also cotton mills. *Ambala* is a modern town of British origin, and a railway junction. *Patiala,* the capital of the Indian state of that name, is a trade centre for south-eastern Punjab. *Rawalpindi* is the principal town at the foot of the Himalayas, from which a road runs to the heart of Kashmir. On a spur of the Himalayas near the plains lies *Simla,* the seat of Government of India in the hot weather. It is 7,000 feet above sea-level and reached by a wonderful mountain railway.

**Delhi,** the capital of India, lies between the Punjab Plain and the Ganges Plain. The district around has been constituted a small province, separate from the Punjab and the United Provinces. *Delhi* is a large city of 522,000 inhabitants; it owes its importance largely to its position. From Delhi any place in the plain, either of the Ganges or Indus, is easily reached. In days gone by, when India was invaded from the north-west, the invaders had to pass by

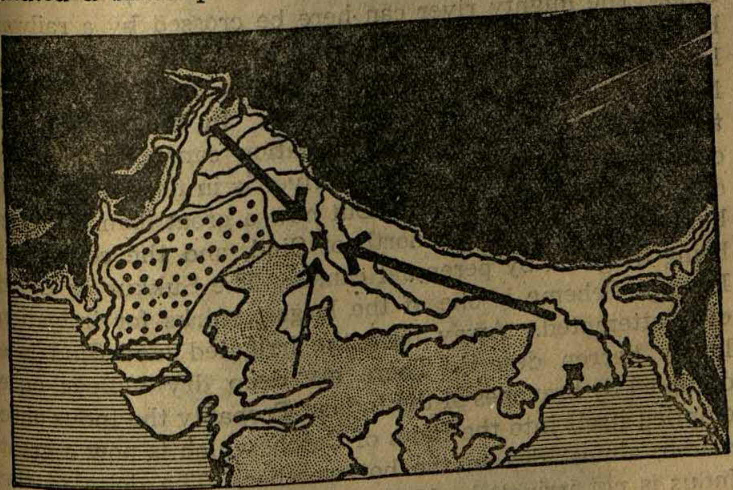


FIG. 140.—The Position of Delhi.

Delhi, because they were shut in by the Himalaya Mountains on the north and the desert on the south. In the old days the land routes of the north-west joined the water routes down the Jumna and Ganges. In modern days Delhi has become a railway centre. The cotton of the surrounding irrigated lands finds its way to the cotton mills of Delhi.

**Sind** consists of a dry alluvial plain stretching from the edge of the Baluchistan plateau on the west to the Thar Desert on the east. Running from north to south through the centre is its life and soul—the Indus River. Just as Egypt is the gift of the Nile, so is Sind the gift of the Indus. When it leaves the Punjab the river flows through a narrow rocky gorge, which separates the Punjab Plain from Sind. The mighty river can here be crossed by a railway bridge (at Rohri). Sind is very dry, part of it getting less than 5 inches of rain per year. It would be a desert if it were not for the River Indus. In the past, irrigation in Sind has been by "inundation canals," which are only filled with water when the river is in flood, and which dry up in the hot weather. But now a great dam has been built at Sukkur in the north of Sind, and the country is being irrigated by perennial canals. The Sukkur or Lloyd Barrage Scheme is one of the largest works for irrigation ever attempted. Away from the irrigated land Sind is a lonely barren desert. There are deep dry valleys once occupied by branches of the Indus. Probably the Indus once emptied itself into the Rann of Cutch, which is now a great marsh, almost dry in the hot weather. The delta of the Indus is not irrigated. Much of it is waste, though part is covered with pasture land. Practically no "dry" crops are grown in Sind. On the irrigated land wheat, millet, and cotton are the leading crops. See fig. 91, p. 185 ante.

The largest town in Sind is *Karachi*, the capital of Pakistan. Although not a very good harbour (it is protected by a breakwater), it is the natural outlet of the Punjab and rapidly growing. Notice the railways from Karachi. It is the great wheat port of Pakistan, exporting the wheat of the Punjab and also large quantities of cotton. It is growing in importance as an air-port. Regular aeroplane services now fly to London and to the other great ports of India. Another important town is *Hyderabad* near the head of the delta.

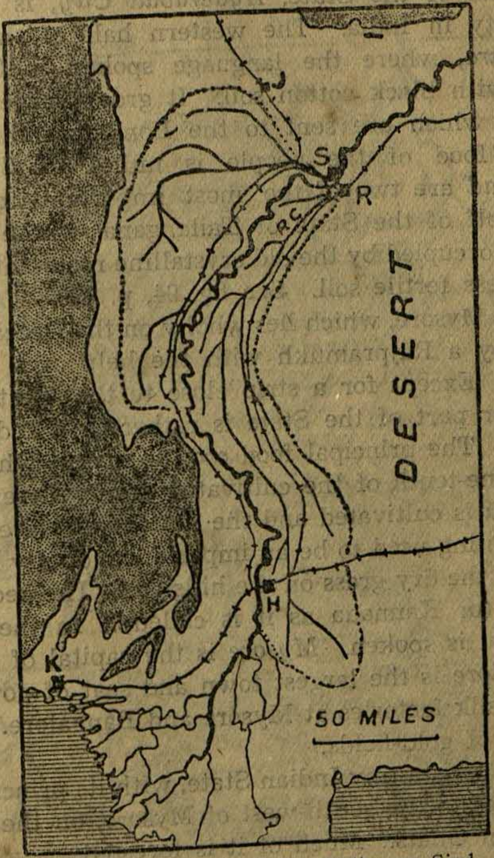


FIG. 141.—The Lower Indus Valley or Sind. Land above 1000 feet, dotted; above 3000 feet, black.

## (c) THE PLATEAU

**Hyderabad.**—Hyderabad, the largest Native State, has ac-eded to India and is ruled by the Nizam as the Rajpramukh. he capital of the State, *Hyderabad City,* is the fourth argest city in India. The western half of the State or *arathwara,* where the language spoken is Marathi, is overed with black cotton soil. It grows large quantities f cotton which are sent to the Bombay mills, and the rincipal food of the people is millet. *Gulbarga* and *urangabad* are two of the most important towns. The astern half of the State or Tailangana, where Telugu is poken, is occupied by the old crystalline rock plateau which ields a less fertile soil. See fig. 94, p. 190.

**Mysore.**—Mysore, which lies wholly on the Deccan plateau, s ruled by a Rajpramukh with the help of a council of ninisters. Except for a strip close to the Western Ghats he greater part of the State is rather dry, and lies over ,000 feet. The principal food crop is millet, whilst cotton ccupies one-tenth of the cultivated area. More than half he plateau is cultivated and the flatter parts are irrigated. offee planting used to be an important industry and sheep lourish on the dry grass on the hillsides. The people speak anarese (or Kannada as it is called). In the northern art Telugu is spoken. *Mysore* is the capital of the State, ut *Bangalore* is the largest town and seat of government. here are silk factories at Mysore and Bangalore. *Kolar* is he centre of gold-fields.

**Coorg.**—Coorg, a tiny Indian State, with its principal town, *ercara,* lies to the south-west of Mysore, on the slopes of he Western Ghats. Much of it is forested.

**Rajasthan and Ajmer-Merwara.**—Rajasthan is a federation of Indian states in the north-west of India, south of the Hindustan Plains. In the centre lies the small Indian Province of Ajmer-Merwara. Running through the centre of Rajasthan from south-west to north-east is the Aravalli

Range. North-west of this range the country is dry and forms the Thar or Great Indian Desert. South-east of the Aravalli Range there is an upland country, the Rajput Upland.

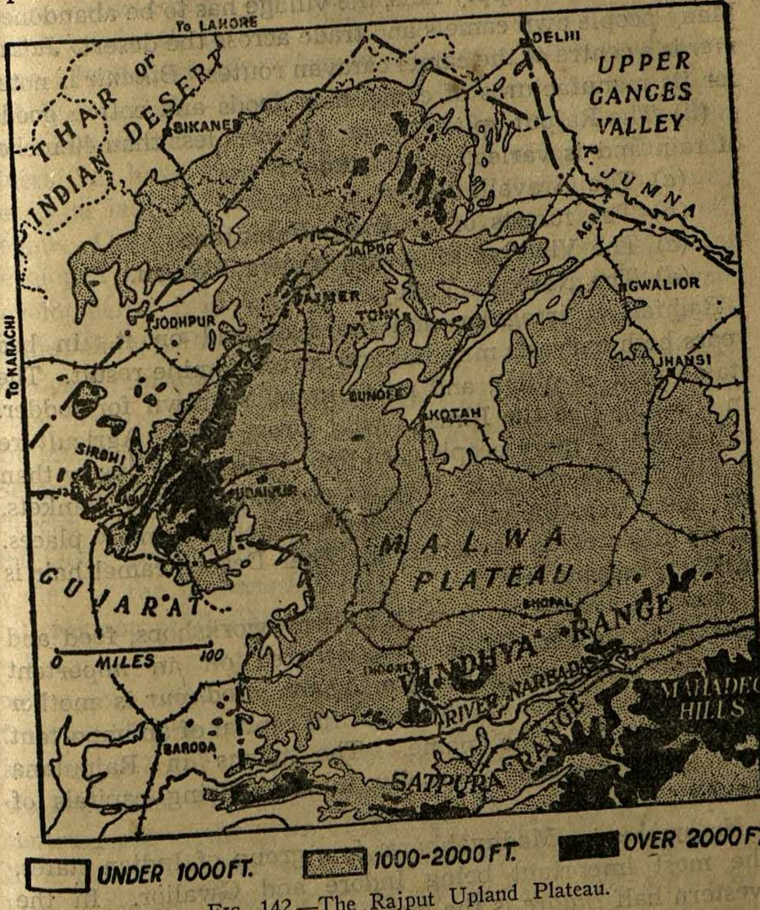


FIG. 142.—The Rajput Upland Plateau.

(*i*) The Thar Desert is a vast area lying between t Aravalli Hills and the plain. It is a sandy waste, interrupt by bare rocky hills and waterless valleys. The ground is often entirely bare. There are no rivers nor irrigation. The desert is almost uninhabited. Villages may spring up where there is a little water, and some millet can be grown; but when the water supply fails, the village has to be abandoned. Many people own camels and trade across the desert. *Jaisalmer* is a centre of the camel caravan routes. *Bikanir* is noted for its manufactures of camel-hair goods and cotton goods.

(*ii*) The Rajput upland region receives less than 40 inches of rain and is varied, and includes:

(*a*) The Aravalli Range.
(*b*) The forests of Southern Rajputana.
(*c*) The Vindhya hills with Malwa Plateau.
(*d*) The Narbada Valley.

Rainfall is irregular and crops depend on it. In bad years both harvests may fail and severe famine result. The staple food is millet, and much gram is grown for fodder. In the hills live the Bhils, a wild forest tribe. Agriculture is bad, and so more people earn their living by industry than in other parts of India. Woollen goods, especially blankets, are made from the wool of sheep and goats in many places. In the drier parts, bordering the Thar Desert, camel hair is used for carpets, etc.

*Amer* is a large town with railway workshops, food and textile industries. It is also situated on an important railway. *Jaipur* is larger than Ajmer. *Jodhpur* is another large town. *Udaipur* is the beautiful capital of an important State of the same name. The towns in Rajputana owe their importance usually to their being capitals of States.

**Madhyabharat.**—Madhyabharat is a group of Indian states, the most important being Indore and Gwalior. In the western half *Indore* is the largest town and is an industrial centre. *Bhopal* has few industries and is getting smaller. *Lashkar* and *Ujjain* have cotton factories. The town of

*Gwalior* is on the borders of the Ganges Valley. Bundelkhand and Baghelkhand form the northern part of the Madhya Pradesh, the eastern part of the Madhyabharat and a strip of the United provinces south of the River Jumna (including the district of Jhansi). The rainfall is about 40 inches; millet and cotton are important crops. *Jhansi* occupies a key position as a railway junction.

**Madhya Pradesh.**—Madhya Pradesh occupies a large area in the heart of India. They are larger than the United Provinces, but have only one-third as many people. They are nearly as large as Madras, but have less than half as many people. On the whole, the Madhya Pradesh are not well developed largely because the country is not suited for development. It is very varied. Running through the north of the Madhya Pradesh is the great line of highlands which divides Peninsular India from Northern India—the Satpura Line. In the Madhya Pradesh the highlands are known as the Mahadeo Hills and the Maikal Range and pass eastwards. Berar forms part of the great cotton-growing region of the Deccan Lavas. The flat land round Nagpur forms part of the Godavari Valley. Around Raipur is another plain, the Valley of the Mahanadi, whilst in the south are the wind hill regions of the Eastern Ghats.

Berar is the most developed region on account of its rich cotton soil. *Akola* and *Amraoti* are the collecting centres from which the cotton is sent by rail to Bombay. Coal is known to occur in the Godavari Valley, but is not yet worked. The Mahanadi Valley is a rice-growing region centring round the town of Raipur. The rainfall is only a little over 40 inches, so a good proportion of the land has been irrigated. The Eastern Ghats are inhabited largely by primitive forest tribes. The hills are forest-covered, and there are many sal trees. *Nagpur* is the capital and

*Jubbulpore* is a large and important town, occupying a key position at the head of the Narbada Valley, just where the Central Highlands can be easily crossed.

### (d) WESTERN INDIA

**Bombay.**—The State of Bombay is very irregular in shape and many parts of it are thinly peopled. It used to include the region known as Sind which is now a province of Pakistan, but under the Reforms this has been constituted a new Province. Sind is really the lower part of the Indus Valley and part of the Plain of Hindustan. The Peninsula of Kathiawar is made up of a number of small Indian states, which have become amalgamated as the state of Saurashtra. Baroda has been integrated with Bombay. The state runs a considerable distance down the west coast of India, and also includes a large section of the plateau of Peninsular India. Thus Western India will fall into a number of natural regions. We can distinguish :

(*a*) Gujarat, including Kathiawar and Baroda, an irregular and variable natural region.

(*b*) The West Coast Region, a very wet region which lies between the Western Ghats and the sea.

(*c*) The Deccan Lavas or Black Cotton Soil Region forming part of the plateau.

**Gujarat** on the whole is a lowland region, but it has numerous small hills. We find the climate of Gujarat varies greatly from one part to another. See fig. 92, p. 186 ante.

SOUTH GUJARAT is the wettest part. Along the coast the soil is salt and almost useless; farther inland are rich black soils where rice, good cotton, and sugar flourish and where many people live. Farther east are poorer soils ( and then dense unhealthy forests inhabited by a few primitive tribes. CENTRAL GUJARAT is drier; rice can be grown on the

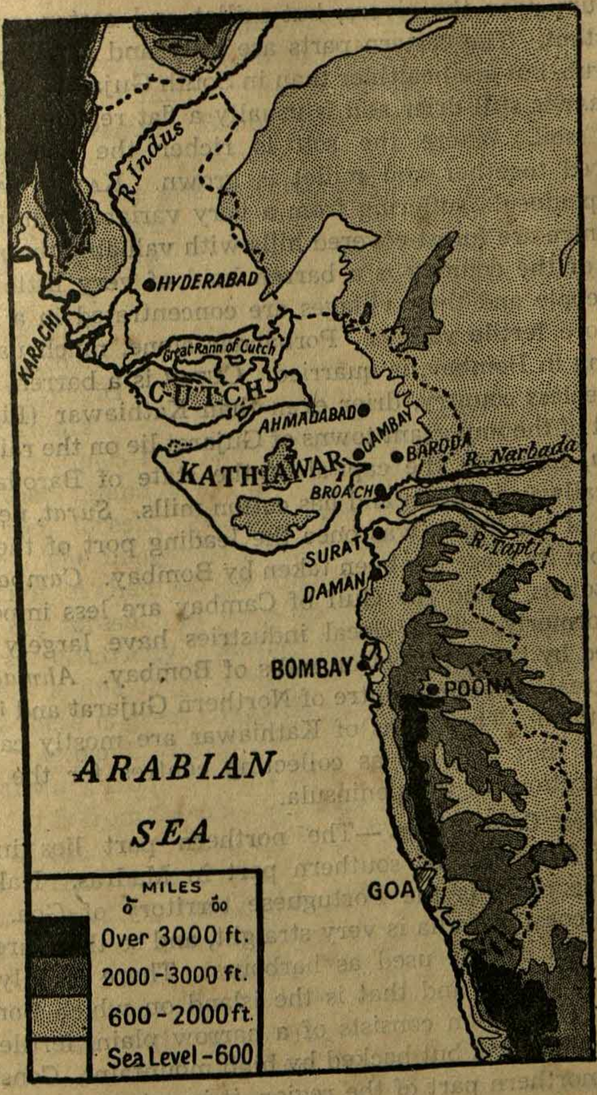


FIG. 143.—The Bombay Presidency and the Province of Sind.

alluvium near the rivers, but millet and cotton are most important. The eastern parts are hilly and partly covered by scrub, but are healthier than in South Gujarat. NORTHERN GUJARAT is still drier and is usually a flat region with poor sandy soil. Where the soil is richer the people have gathered together and millet is grown. KATHIAWAR is a large peninsula suffering from a very variable rainfall. In the centre are forest-covered hills with valuable timber, but much of the country is a barren land of very little value. The people and their villages are concentrated in a few of the more fertile valleys. Porbandar stone, much used for building in Bombay, is quarried. CUTCH is a barren, rocky, and treeless country, drier even than Kathiawar (Fig. 92).

Most of the important towns of Gujarat lie on the railways. *Baroda,* formerly the capital of the state of Baroda, is a large railway junction and has cotton mills. *Surat,* near the mouth of the Tapti, was once the leading port of the west coast, but its place has been taken by Bombay. *Cambay* and other towns round the Gulf of Cambay are less important than formerly. Their local industries have largely been replaced by the great cotton mills of Bombay. *Ahmadabad* is the great collecting centre of Northern Gujarat and is also a mill town. The towns of Kathiawar are mostly capitals of states, but also act as collecting centres for the more fertile portions of the peninsula.

**The West Coast Region.**—The northern part lies in the state of Bombay, the southern part in Madras. Halfway down the coast is the Portuguese territory of Goa. The western coast of India is very straight, and so there are few bays which can be used as harbours. There is only one important island, and that is the island on which Bombay stands. The region consists of a narrow plain, fertile and thickly populated, but backed by high mountains. Considering the northern part of the region, it is only from Bombay that the mountain escarpment of the Western Ghats can be easily crossed. We see that the West Coast Region really falls into three parallel strips. Near the sea are lines of sandbanks on which cocoanuts grow. At intervals are mangrove swamps. Behind the sandbanks are the flat alluvial lands. Everywhere the rainfall is more than 80 inches. Nowhere else in Peninsular India is the rainfall so heavy as it is here.

Study this table.

| Place | Rainfall in one year. |
|---|---|
| Bombay | 80 inches. |
| Matheran | 200 " |
| Ratnagiri | 100 " |
| Kumta | 140 " |

Rice occupies half the cultivated land.

Further inland are the hill-slopes covered with dense evergreen forests. Forests cover a quarter of the whole region. The many short rivers are of little use for boats, but many of them can be used to float logs or timber down from the forests. In years to come they may be used to generate electricity. *Bombay* is the only really large town and has a fine large natural harbour. Being built on an island there is great congestion in the town, for it has little room to expand. Notice the gaps in the hills through which the railways from Bombay pass inland to its fertile hinterland. It is from the plateau region behind that Bombay gets most of the raw cotton for its numerous cotton mills.

**The Deccan Lavas Region.**—The north-western part of the great plateau of Peninsular India has been covered by great sheets of a lava which weathers into a dark soil, particularly suited to cotton. The great sheets of lava have only been cut through by some of the deeper river valleys, such as that of the River Tapti. The region is over 1,000 feet above sea-level, and there are large areas over 2,000 feet. The Deccan Lavas Region lies in the rain-shadow of the Ghats, and except along a narrow strip near the Ghats the rainfall is less than 40 inches. Forests cover a considerable area and are found especially on the slopes of the Western

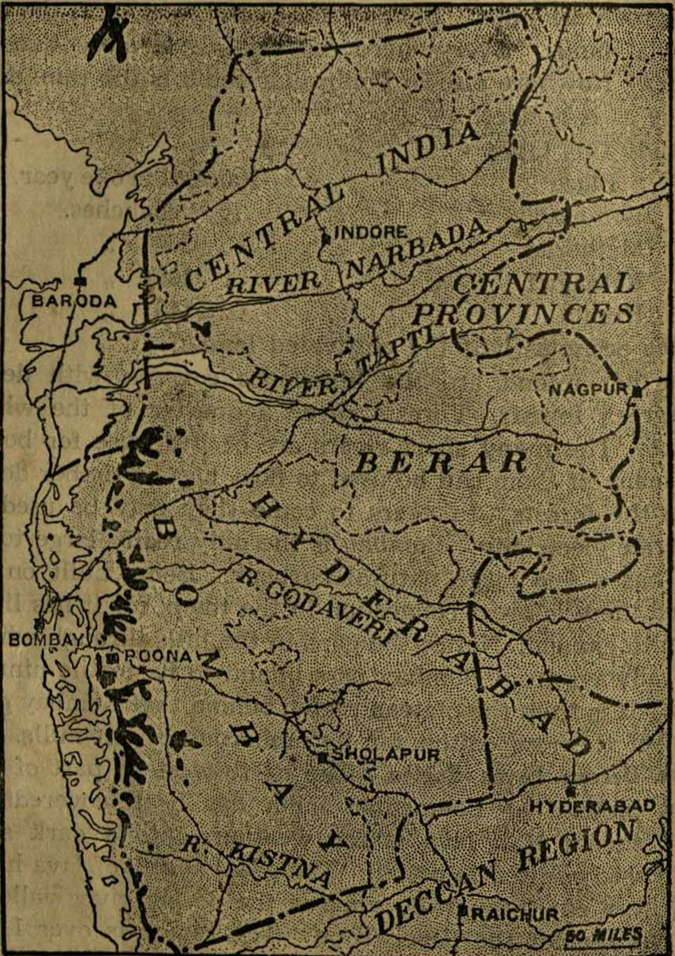


FIG. 144.—The Deccan Lavas Region.
Land over 500 feet, dotted; land over 2,000 feet, black.

Ghats. There grow teak and other valuable trees. Two-thirds of the area is cultivated, but the crops are nearly all dry crops since there is little flat land available for irrigation, nor are there any large permanent streams whose water could be used. The use of wheat is spreading, but the staple food grain is still millet, and millet covers nearly half the cultivated land. This is the greatest cotton-growing region of India, and nearly a quarter of the cultivated land is devoted to cotton. The short-stapled Indian cotton is grown principally. The raw cotton is sent to Bombay, either to be exported raw or used in the mills there.

This region does not support so many people as the wetter rice-growing lands, and there are only about 150 people to the square mile. The people speak Marathi. *Poona* lies near the crest of the Western Ghats, and commands one of the gateways leading to Bombay. It is the hot-weather capital of the Bombay Presidency. *Sholapur* is a big centre farther south. *Nasik*, a holy city, is situated on the Godavari. It is known for its grapes. South of Poona is *Satara*, the old capital of the Marathas. *Mahableshwar* is a hill station 4,500 feet above sea-level. *Kolhapur*, *Belygaum*, *Dharwar*, *Hubli* and *Bijapur* are important towns in the Southern Maratha country. *Karwar* and *Marmugao* (a Portuguese port) do coasting trade.

## (e) THE STATE OF MADRAS

**Madras.**—Among the Provinces of India, the Presidency of Madras comes next in size after Bombay, but it is much more thickly populated than either. It includes the whole of the southern part of the Peninsula, and stretches along the west coast northwards between Mysore and the sea. It extends along the east coast as far as the boundary with Bihar and Orissa, and in addition to the coastal regions includes a portion of the Deccan Plateau and the Eastern Ghats. (See fig. 94.) Thus the Province lies in the following natural regions:

(*a*) West Coast Region, very wet.

(*b*) Carnatic Region or Tamil Plains forming the southern parts of the east coast.

(c) The Northern Circars Region or northern east coast.

(*d*) The Deccan Plateau.

**The West Coast Region** has already been described in the part under Bombay. The southern part is similar, but the alluvial plains between the hills and the sea are broader. The whole region is very wet and can be divided, still more distinctly, into three strips.

(*a*) The sand dunes along the coast largely covered by cocoanut palms.

(*b*) The flat alluvial land behind the sand dunes. The water of small streams from the hills is prevented from reaching the sea by the line of sand dunes, and so spreads out to form shallow lagoons. The lagoons have been connected by canals, and it is possible to travel for hundreds of miles along the west coast through these canals. Many of the lagoons are open to the sea, and some are deep enough to form harbours for native craft. One, the harbour of Cochin, has been dredged near its mouth, and forms a very important harbour on the west coast. The banks of the lagoons are often lined with cocoanut plantations, whilst every suitable piece of land is planted with paddy. Here and there are groves of the areca or betel-nut palm, and the pepper plant, for which this coast has so long been famous, is still grown.

(c) The slopes of the Western Ghats are covered with dense evergreen forests, and forests cover nearly a quarter of the whole region.

This region is densely populated. The staple food is ce, but many of the rice cultivators are backward, jungle tribes. The cocoanut palm is of great importance to the inhabitants. Their huts are thatched with its leaves; the wood is used for building and for firewood. The preparation of the fibre of the husks or "coir-picking" is an important industry and the dried kernel (copra) is exported. Cocoanut oil is also obtained, and the juice of the cocoanut is made into a strong drink. Rubber planting is becoming a noteworthy industry in Travancore. Fishing is a common occupation along the coast. *Mangalore* is a small town connected by rail with Madras. *Calicut* is the fourth largest town in Madras and has a small timber trade. Like Cochin, it was once a famous spice port. *Cochin* is likely to increase greatly in size and importance now that the harbour is deepened. *Alleppey* and *Quilon* in Travancore are growing industrial centres where coir rope and mats are made. *Trivandrum* is the chief town of Travancore and can now be reached by railway from Madras.

**The Carnatic Region** falls into two parts: the lowlands near the coast or Coastal Plain, and the hilly western part. The Coastal Plain consists mainly of alluvium, but the hills are of old hard rocks. The climate of this region is different from that of all other parts of India. The rainiest months are October, November, and December. The rain is brought mainly when the North-East Monsoon has commenced to blow. When the South-West Monsoon is blowing this region lies in the rain-shadow of the Cardamom Hills and the Deccan Plateau. In June, when the west coast is cooled by rain or the sun is hidden by clouds, the neighbourhood of Madras is hot and the sky is clear. Forests cover a quarter of the hilly parts. This part of India used to suffer from famine. The people have made many large "tanks" or lakes in which the rain-water can be stored, and the water used when the crops badly need it. But in bad rainfall years, the tanks may never be filled. Government has now completed a number of large irrigation works in the region,

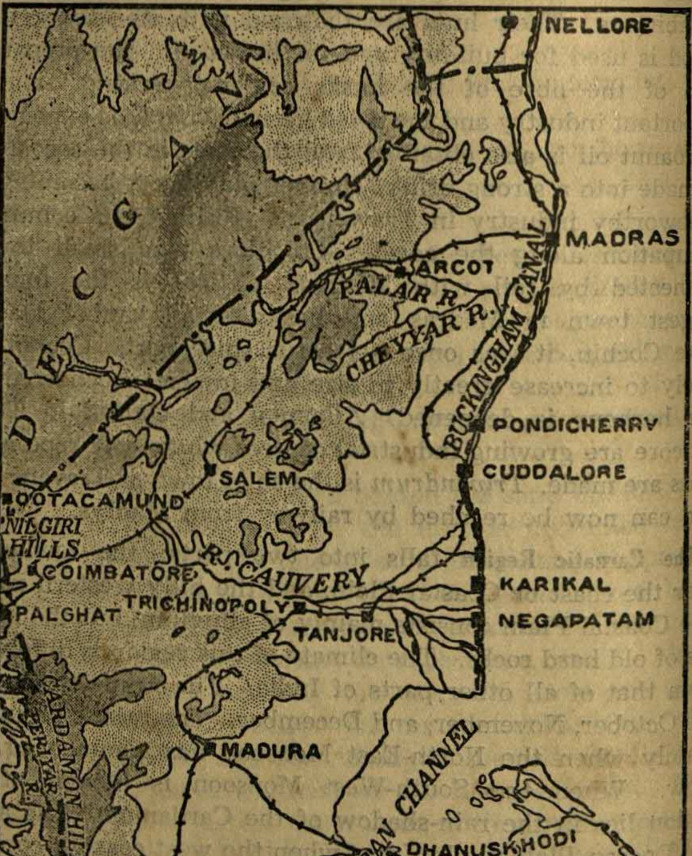


FIG. 145.—The Carnatic Region.

but the irrigated land is not nearly so extensive as in the dry parts of the Hindustan Plain.

(a) *The Periyar Project.*—The Periyar River flows down the very wet western side of the Cardamom Hills. The water has now been brought through tunnel to the dry eastern side of the hills, and used to water the flat land round Madura.

(b) West of Madras a large tract of country is watered from the Poini, and Cheyyar rivers.

(c) A great system of canals covers the Cauvery Delta. This is one of the oldest of the large irrigation works in India.

We must notice the effects of irrigation on the crops. In the coast lands rice is more important than millet, in the hills millet is more important than rice. Both are used by the people as staple foods. Everywhere a considerable area is devoted to ground-nuts and cotton. The ground-nuts are grown for their oil. Down the sandy dunes of the coast many cocoanuts are grown. On the slopes of the Nilgiri Hills there are tea-garden. The most important trees of the forests are teak and sandal wood. Mica is mined in *Nellore.* Along the coast salt is obtained from the sea, and there are many fishermen. The people all speak Tamil. Along the coast there are no inlets to serve as harbours. At the small ports steamers have to anchor a mile or more from the shore, and land their goods and passengers by small boats.

**The Northern Circars Region.**—Although a coastal region, it is scarcely a coastal plain, for there are many small hills, some of which come right to the sea. The region lies between the crest of the Eastern Ghats and the Bay of Bengal. The central part is made up of the big deltas of the Godavari and Kistna rivers. These deltas are irrigated. Manganese ore is obtained near Vizagapatam. Unlike the Carnatic Region, the rain falls during the South-West Monsoon. More than half the land is cultivated; on the damper hills there are forests. Taking the region as a whole, rice is the chief crop followed by millet. It is interesting to notice the effect of rainfall on crops. The dry district of Guntur, with 31 inches of rain has only 3 per cent of rice. Northwards there is a gradual increase in rainfall and rice; wet Ganjam with 45 inches of rain has 54 per cent of rice. See fig. 95 ante.

Bellary, Kurnool, Anantapur, Cuddapah, and part of Chitoor are the "Deccan Districts" of Madras and the Eastern Ghats are partly occupied by the Agency division.

*Madras* has the only good harbour along the coast. It is entirely artificial. It is the third largest city and the fifth greatest port in India. As a port its trade is less than Karachi and Rangoon. There are cotton mills in Madras and Madura and both cotton goods and raw cotton are exported. The tanning of hides is an important industry and a great deal of leather is exported. *Pondicherry* is the capital of the French possessions in India, which comprise a few small isolated towns. *Cuddalore* and *Tuticorin* (famous for pearl fisheries) are two ports. *Dhanushkodi* is only 22 miles from the nearest point of Ceylon. It is not really a town but merely the terminus of the South Indian Railway; the mails to

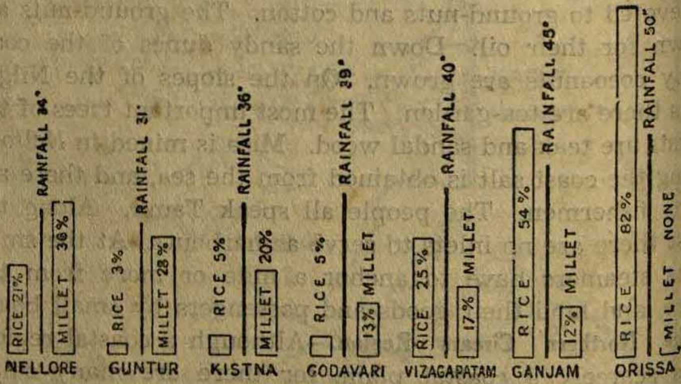


FIG. 146.—Crops and rainfall on the east coast.

Ceylon go by this route. *Madura, Trichinopoly* and *Tanjore* are inland centres. There are no good harbours on the coast, but a big harbour scheme has been carried out at *Vizagapatam*. A railway has been made from Vizagapatam to the heart of Central India. *Cocanada* is at present a flourishing port, and has a small but rich hinterland. *Masulipatam, Calingapatam* and *Gopalpur* are other small ports. *Vizianagram* is a large inland town.

**Orissa.**—Constituted a Province since 1937, Orissa includes the rich fertile northern part of the east coast plain with *Puri*, a famous place of pilgrimage and *Cuttack*, a former capital of ancient kings, together with the southern part of the Chota Nagpur plateau. On the coastal strip rice occupies four-fifths of the cultivated land (fig. 146).

**The Partition.**—The partition of Bengal and Punjab came about in 1947 under the Radcliffe Award. West Bengal and East Punjab formed part of India and East Bengal and West Punjab went to Pakistan. West Bengal is made up of the whole of Burdwan Division, part of the Presidency Division and two police stations of Jessore. With the merger of the state of Cooch Bihar West Bengal's area is 29,476 square miles. The rest of undivided Bengal comprises East Pakistan with Dacca as its capital. East Punjab, now called Punjab (India), includes the Jullunder and Ambala Divisions, the Amritsar District of Lahore Division and parts of Gurudaspur and Lahore Districts. Three tiny states have been merged into Punjab. Her area is 37,428 square miles. The rest of undivided Punjab now comprises Punjab (Pakistan).

**The Federation**—The Federation envisaged in the Government of India Act, 1935, has come into being in India. The Indian Union now consists of autonomous states delegating some of their powers to the Central Government. The integration of the Native States is now virtually complete and India has a real political unity.

## SOME STATISTICAL TABLES

### TABLE I

[POPULATION OF TOWNS AND CITIES (1931 AND 1941)]

| | | (1941) | (1931) |
|---|---|---|---|
| 1. | Calcutta (with Howrah) | 2,488,000 | 1,485,000 |
| 2. | Bombay | 1,490,000 | 1,161,000 |
| 3. | Madras | 777,000 | 647,000 |
| 4. | Hyderabad | 733,000 | 647,000 |
| 5. | Delhi | 522,000 | 447,000 |
| 6. | Lahore | 672,000 | 430,000 |
| 7. | Rangoon (Burma) | .... | 400,000 |
| 8. | Ahmedabad | 591,000 | 314,000 |
| 9. | Bangalore | 407,000 | 306,000 |
| 10. | Lucknow | 387,000 | 275,000 |
| 11. | Amritsar | 391,000 | 265,000 |
| 12. | Karachi | 360,000 | 264,000 |
| 13. | Poona | 258,000 | 250,000 |
| 14. | Cawnpore | 437,000 | 244,000 |
| 15. | Agra | 284,000 | 230,000 |
| 16. | Nagpur | 302,000 | 215,000 |
| 17. | Benares | 363,000 | 205,000 |
| 18. | Allahabad | 260,000 | 184,000 |
| 19. | Madura | 239,000 | 182,000 |
| 20. | Srinagar | 208,000 | 174,000 |
| 21. | Patna | 176,000 | 160,000 |
| 22. | Mandalay (Burma) | .... | 148,000 |
| 23. | Sholapur | 213,000 | 145,000 |
| 24. | Jaipur | 176,000 | 144,000 |
| 25. | Bareilly | 193,000 | 144,000 |
| 26. | Trichinopoly | 160,000 | 143,000 |
| 27. | Dacca | 213,000 | 139,000 |
| 28. | Meerut | 169,000 | 137,000 |
| 29. | Indore | 204,000 | 127,000 |
| 30. | Jubbulpore | 178,000 | 124,000 |
| 31. | Peshawar | 131,000 | 122,000 |
| 32. | Ajmer | 147,000 | 120,000 |
| 33. | Multan | 143,000 | 119,000 |
| 34. | Rawalpindi | 183,000 | 119,000 |

## TABLE II

### LANGUAGES (1931)

| Language | Number of speakers | |
|---|---|---|
| | Men | Women |
| Western Hindi | 38,000 | 34,000 |
| Bengali | 28,000 | 26,000 |
| Telugu | 13,000 | 13,000 |
| Marathi | 11,000 | 10,000 |
| Tamil | | 10,000 |
| Punjabi | 9,000 | 7,000 |
| Rajasthani | 7,000 | 7,000 |
| Kanarese | 6,000 | 6,000 |
| Oriya | 5,000 | 6,000 |
| Gujarati | 6,000 | 5,000 |
| Burmese | 4,000 | 5,000 |
| Malayalam | 5,000 | 5,000 |
| Sindhi | 2,000 | 2,000 |
| Bhili | 1,000 | 1,000 |
| Assamese | 1,000 | 1,000 |
| Eastern Hindi | 4,000 | 3,000 |
| Kashmiri | 800 | 700 |
| Balochi | 300 | 300 |
| Munda Languages | 2,000 | 2,000 |

## TABLE III

### OCCUPATIONS OF INDIA (1931)

| OCCUPATIONS | NUMBER OF PEOPLE |
|---|---|
| Domestic Service | 300 |
| Agriculture | 300 |
| Industry | 50 |
| Trade (Shop-keepers, etc.) | 27 |
| Textiles | 13 |
| Stock-farming | 11 |
| Transport, Railways, etc. | 8 |
| Priests, doctors, teachers, etc. | |
| Government, Police, etc. | 4 |
| Beggards | 4 |
| Fishing | 3 |
| Mining | 1 |
| Forestry | 1 |

## TABLE IV

### NUMBERS OF CHIEF CASTES

| | |
|---|---|
| Baniya | 2,800,000 |
| Brahman | 14,250,000 |
| Chamar | 11,260,000 |
| Dhobi | 2,000,000 |
| Gond | 2,900,000 |
| Hajjam | 2,900,000 |
| Jat | 7,400,000 |
| Kayastha | 2,300,000 |
| Koli | 2,500,000 |
| Kumbar | 3,350,000 |
| Kumbi | 8,300,000 |
| Lingayat | 2,700,000 |
| Mahar | 3,000,000 |
| Maratha | 6,600,000 |
| Namasudra | 2,200,000 |
| Pathan | 3,500,000 |
| Rajput | 9,800.000 |
| Teli | 4,200,000 |

## TABLE V

### Crops Grown (in Acres Sown in 1930-31)

*(Add ooo to all figures)*

| Province | Rice | Wheat | Sugar | Cotton | Tea | Fodder |
|---|---|---|---|---|---|---|
| Bombay .. .. | 3,000 | 2,000 | 65 | 4,000 | — | 2,000 |
| Madras .. .. | 12,000 | 20 | 115 | 2,000 | 66 | 450 |
| Bengal .. .. | 21,000 | 143 | 199 | 58 | 200 | 95 |
| Central Provinces & Berar | 6,000 | 3,000 | 21 | 5,000 | — | 431 |
| United Provinces .. | 7,000 | 8,000 | 1,500 | 800 | 6 | 1,000 |
| Punjab .. .. | 1,000 | 9,000 | 400 | 2,000 | 10 | 5,000 |

## TABLE VI

### Live Stock, etc. (vtcj-cv)

*(Add ooo to all figures)*

| Province | Oxen | Buffaloes | Sheep | Goats | Horses | Mules and Donkeys | Camels | Ploughs | Carts |
|---|---|---|---|---|---|---|---|---|---|
| Bombay .. | 8,600 | 2,800 | 2,600 | 3,900 | 200 | 200 | 200 | 1,600 | 700 |
| Madras .. | 16,500 | 6,000 | 12,900 | 7,500 | 40 | 130 | — | 4,500 | 1,300 |
| Bengal .. | 24,200 | 1,000 | 600 | 5,500 | 100 | 2 | — | 5,000 | 900 |
| Central Provinces and Berar .. | 10,500 | 2,000 | 380 | 1,700 | 130 | 35 | — | 1,600 | 1,000 |
| United Provinces | 23,000 | 8,600 | 2,200 | 6,600 | 470 | 270 | 25 | 5,000 | 1,000 |
| Punjab .. | 9,000 | 5,200 | 4,500 | 3,700 | 410 | 640 | 280 | 2,300 | 340 |

## TABLE VII

### Cultivation (in Thousands of Acres) in 1930-31

| Province | Forest | Not available for cultivation | Waste: good land but not used | Irrigated |
|---|---|---|---|---|
| Bombay .. .. | 9,100 | 19,900 | 6,800 | 4,500 |
| Sind .. .. | 600 | 8,800 | 3,800 | 2,300 |
| Madras .. .. | 13,400 | 20,200 | 13,000 | 11,300 |
| Bengal .. .. | 4,600 | 9,600 | 6,000 | 1,700 |
| United Provinces .. | 7,300 | 10,000 | 10,700 | 11,300 |
| Punjab .. .. | 2,000 | 12,800 | 14,9000 | 15,000 |

## TABLE VIII

### AREA AND POPULATION

| Province or State | Area (Sq. miles) | Population 1941 | Density |
|---|---|---|---|
| Sind | 46,000 | 4,537,000 | |
| Bombay | 77,000 | 20,858,000 | |
| Bengal | 78,000 | 60,314,000 | |
| Central Provinces | 100,000 | 16,822,000 | |
| Madras | 142,000 | 49,342,000 | |
| Punjab | 99,000 | 28,419,000 | |
| N.W.F.P. | 40,000 | 3,038,000 | |
| United Provinces | 106,000 | 55,021,000 | |
| Bihar | 69,000 | 36,340,000 | |
| Orissa | 32,000 | 8,729,000 | |
| Assam | 55,000 | 10,205,000 | |
| Baroda | 8,000 | 2,855,000 | |
| Hyderabad | 83,000 | 16,184,000 | |
| Kashmir and Jammu | 85,000 | 4,021,000 | |
| Mysore | 29,000 | 7,329,000 | |
| Rajputana Agency | 31,000 | 13,670,000 | |
| W. India States Agency | 23,500 | 4,901,000 | |

## TABLE IX

### TEMPERATURE AND RAINFALL

| Town | July | January | Range | Mean annual temperature | Altitude in ft. | Average rainfall in inches |
|---|---|---|---|---|---|---|
| **I. Hill Stations—** | | | | | | |
| 1. Shillong .. | 70 | 50 | | 31° | 4921 | 83 |
| 2. Simla .. | 67 | 40 | | 55° | 7224 | 68 |
| 3. Srinagar .. | 74 | 33 | | 53° | 5204 | 27 |
| 4. Ootacamund .. | 58 | 54 | | 57° | 7327 | 47 |
| **II. Coastal Towns—** | | | | | | |
| 1. Karachi .. | 89 | 68 | | 77° | 27 | 8 |
| 2. Bombay .. | 90 | 75 | | 79° | 37 | 74 |
| 3. Madras .. | 88 | 76 | | 81° | 22 | 49 |
| 4. Rangoon .. | 80 | 77 | | 79° | 57 | 100 |
| 5. Calcutta .. | 80 | 66 | | 72° | 21 | 64 |
| 6. Colombo .. | 81 | 79 | | 80° | 39 | 95 |
| **III. Places on Plains—** | | | | | | |
| 1. Allahabad .. | 87 | 68 | | 77° | 309 | 40 |
| 2. Delhi .. | 92 | 59 | | 77° | 718 | 28 |
| 3. Lahore .. | 90 | 54 | | 74° | 702 | 21 |
| **IV. Places on Plateaux—** | | | | | | |
| 1. Nagpur .. | 81 | 70 | | 79° | 1025 | 46 |
| 2. Poona .. | 100 | 53 | | 75° | 1840 | 28 |

## TABLE X

### TEMPERATURES (NOT REDUCED TO SEA-LEVEL) AND RAINFALL

| Station | Month | Max. | Min. | Average | Rain Inches |
|---|---|---|---|---|---|
| Dharwar (West Coast Region) | January | 86·4 | 65·8 | | 0·06 |
| | February | 86·0 | 67·0 | | 0·01 |
| | March | 87·5 | 72·4 | | .. |
| | April | 89·5 | 77·5 | | 0·51 |
| | May | 89·7 | 79·7 | | 3·08 |
| | June | 85·2 | 76·2 | | 37·30 |
| | July | 82·9 | 75·2 | | 39·12 |
| | August | 82·4 | 74·7 | | 20·59 |
| | September | 82·6 | 74·0 | | 10·58 |
| | October | 85·4 | 73·6 | | 5·43 |
| | November | 87·6 | 69·5 | | 1·47 |
| | December | 87·6 | 66·4 | | 0·21 |
| Negapatam (Carnatic Region) | January | 82·4 | 71·4 | | 1·54 |
| | February | 84·8 | 72·7 | | 0·91 |
| | March | 88·8 | 75·9 | | 0·34 |
| | April | 92·7 | 79·3 | | 0·80 |
| | May | 97·6 | 80·2 | | 1·99 |
| | June | 97·6 | 79·4 | | 1·46 |
| | July | 95·9 | 78·4 | | 1·85 |
| | August | 93·9 | 77·3 | | 3·54 |
| | September | 92·7 | 76·7 | | 3·75 |
| | October | 88·7 | 76·2 | | 10·53 |
| | November | 84·5 | 74·3 | | 15·70 |
| | December | 82·1 | 72·1 | | 11·21 |
| Kalat (Baluchistan) | January | 50·7 | 21·5 | | 1·65 |
| | February | 53·2 | 23·6 | | 1·83 |
| | March | 63·4 | 32·3 | | 1·29 |
| | April | 74·2 | 36·8 | | 0·57 |
| | May | 83·6 | 42·6 | | 0·22 |
| | June | 91·2 | 47·9 | | 0·22 |
| | July | 93·2 | 53·3 | | 0·56 |
| | August | 91·3 | 49·2 | | 0·45 |
| | September | 85·4 | 38·4 | | 0·03 |
| | October | 74·5 | 30·0 | | 0·16 |
| | November | 67·2 | 27·1 | | 0·51 |
| | December | 57·7 | 24·1 | | 0·85 |

## TABLE X—(*contd.*)

| Station | Month | Max. | Min. | Average | Rain Inches |
|---|---|---|---|---|---|
| Bellary (Deccan Region) | January .. | 88·2 | 61·6 | | 0·08 |
| | February .. | 94·2 | 65·9 | | 0·07 |
| | March .. | 100·5 | 72·2 | | 0·21 |
| | April .. | 103·6 | 77·2 | | 0·80 |
| | May .. | 102·5 | 77·6 | | 1·91 |
| | June .. | 94·8 | 75·8 | | 2·16 |
| | July .. | 91·0 | 75·0 | | 1·62 |
| | August .. | 91·8 | 73·8 | | 2·17 |
| | September .. | 90·6 | 72·9 | | 4·61 |
| | October .. | 90·3 | 71·2 | | 4·08 |
| | November .. | 87·4 | 65·0 | | 1·73 |
| | December .. | 85·9 | 61·3 | | 0·09 |
| Poona (Deccan Lavas Region) | January .. | 86·2 | 54·2 | | 0·09 |
| | February .. | 90·9 | 56·2 | | 0·03 |
| | March .. | 97·5 | 63·2 | | 0·94 |
| | April .. | 101·7 | 69·2 | | 0·66 |
| | May .. | 99·7 | 71·8 | | 1·28 |
| | June .. | 89·8 | 72·6 | | 5·67 |
| | July .. | 82·5 | 70·9 | | 7·67 |
| | August .. | 81·7 | 69·6 | | 3·77 |
| | September .. | 84·4 | 68·6 | | 4·70 |
| | October .. | 89·0 | 66·4 | | 4·04 |
| | November .. | 86·7 | 58·8 | | 0·99 |
| | December .. | 84·6 | 53·8 | | 0·25 |

## QUESTIONS AND EXERCISES

*N.B.*:—Illustrate your answers by diagrams, sketches, etc.

1. Draw a map of India and show on it the following:—
   (1) Lucknow, Gwalior, Nagpur, Matheran.
   (2) Three sacred places.
   (3) Four places of historical importance.
   (4) Six important military stations.

*Or*

Draw a map of India and show on it (*a*) the principal ports; (*b*) the chief hill stations. (B. U. 1927)

2. Describe the geographical factors that have contributed to the origin and growth of the following:—

Bombay, Ahmedabad, Poona, Cawnpore, Allahabad, Patna, Cuttack, Jamshedpur, Trichinopoly, and Madura.

*Or*

Give reasons for the location and importance of the following:—

Calcutta, Peshawar, Delhi, Lucknow, Quetta, Bijapur and Amritsar.

3. Explain how far geographical conditions account for the following:—

(1) Flat roofs on houses in Sind.
(2) Thrifty habits of the Marwaris. (B. U. 1930)
(3) Commercial instincts of the Gujarathis.
(4) The simple habits of the Madrasis.
(5) Absence of a railway in Konkan.
(6) Bombay is the gateway of India.

4. Divide the State of Bombay into its natural regions. Write a short account of the region in which you live or which is best known to you. Draw a sketch map to illustrate your answer. (B. U. 1934)

*Or*

Draw a map of the State of Bombay showing two towns in each region.

5. Write short notes on the following:—

The Everest Expedition.
Adam's Bridge.
The Backwaters of Malabar.
Vale of Kashmir.
Gersoppa Falls.
Sukkur Barrage Scheme.

(B. U. 1920—'21—'24—'26)

6. Explain how geographical conditions affect the life and occupations of the following peoples:—

(1) The Gurkhas, (2) the Bengalis. (B. U. 1926)

7. Which do you consider to be the eight chief ports of undivided India? Write short notes on each stating your reasons for your selection.

8. Fill in the blank columns in Tables VIII—X above.

9. Read the climograph on p. 303. Which is the rainiest of the four places represented in the climograph? Which is the least rainy? Which place shows the greatest range of temperature? Which place shows the least range? Find the location of each on the map.

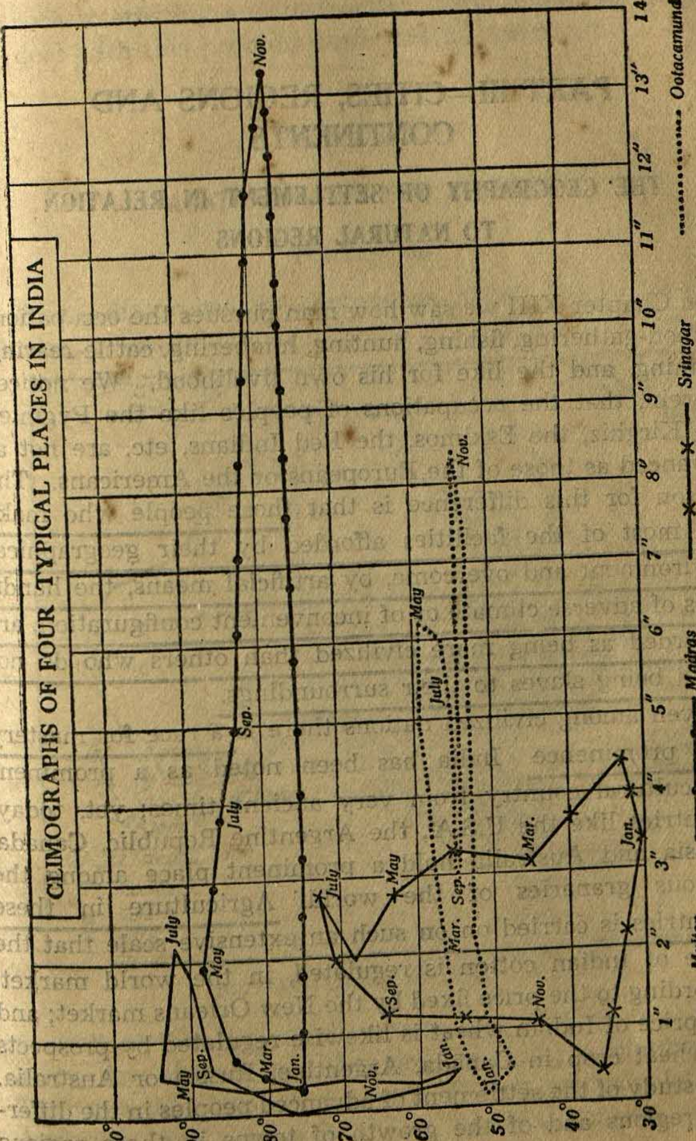


FIG. 147.—Climograph of Four Typical places in India.

# PART III—CITIES, REGIONS AND CONTINENTS

## THE GEOGRAPHY OF SETTLEMENT IN RELATION TO NATURAL REGIONS

In Chapter XIII we saw how man pursues the occupations of food-gathering, fishing, hunting, lumbering, cattle-rearing, farming, and the like for his own livelihood. We noticed therein, that the occupations of peoples like the Pygmies, the Kirghiz, the Eskimos, the Red Indians, etc. are not as advanced as those of the Europeans or the Americans. The reason for this difference is that those people who make the most of the facilities afforded by their geographical environment and overcome, by artificial means, the handicaps of adverse climate or of inconvenient configuration, are regarded as being more civilized than others who do not mind being slaves to their surroundings.

Even among civilized nations there is a race for mastery and prominence. India has been noted as a prominent agricultural country from very ancient times; yet, today, countries like the U.S.A., the Argentine Republic, Canada, Russia and Australia hold a prominent place among the famous granaries of the world. Agriculture in these countries is carried on on such an extensive scale that the price of Indian cotton is regulated, in the world market, according to the price fixed by the New Orleans market; and the price of Indian wheat is likewise regulated by prospects of wheat crop in Canada, Argentine, Russia or Australia.

A study of the settlement of advanced peoples in the different regions and of the growth of towns in those regions is both interesting and instructive. We, therefore, propose to deal with this problem continent by continent.

## CHAPTER XXII

## AUSTRALIA AND NEW ZEALAND

### POPULATION

When discovered by Europeans about 300 years ago, Australia was inhabited by very wild natives who were so uncivilised that they used stone weapons. There were only a very few of them, and they are decreasing in numbers. In Tasmania they have all died out. The present population of Australia, apart from the few natives, consists almost

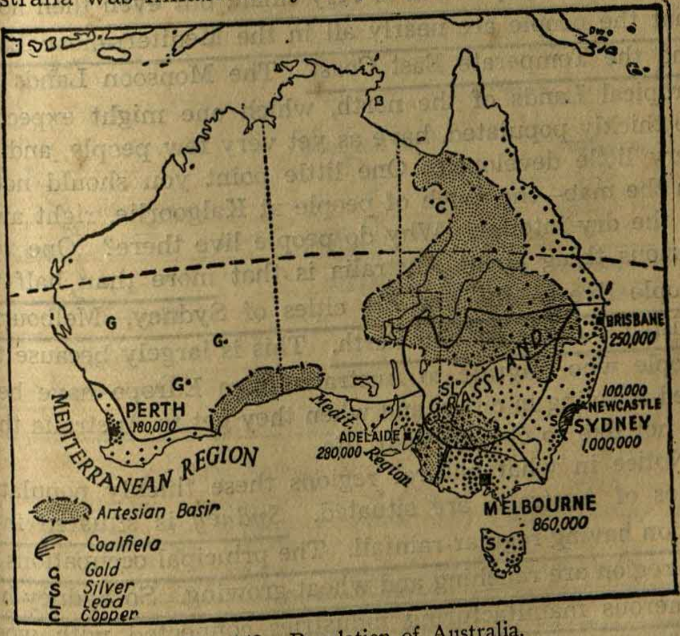


FIG. 148.—Population of Australia.

entirely of white immigrants from Europe. The Australian Government has reserved Australia for white people only. There are various parts of the world which are kept only for natives of various countries—there are parts of North America where there are American-Indian "reserves", there are parts of New Zealand where only the Maoris may live—but Australia is the only country which the white people have entirely to themselves.

Look at the population map of Australia, Fig. 148. How does it compare with the population in the Bombay Presidency? The population is very small, but even then notice that the people are nearly all in the Mediterranean Lands and the Temperate East Coast. The Monsoon Lands and Tropical Lands of the north, which one might expect to be thickly populated, have as yet very few people, and are very little developed. One little point you should notice on the map—the patch of people at Kalgoorlie, right away in the dry interior. Why do people live there? One very curious thing about Australia is that more than half the people live in the five big cities of Sydney, Melbourne, Brisbane, Adelaide, and Perth. This is largely because the people who migrate to Australia from Europe have been used to living in cities, and when they get to Australia they do not like to change their life.

Notice in what natural regions these thickly populated cities of Australia are situated. *Sydney* is situated in a region having regular rainfall. The principal occupations of the region are ranching and wheat-growing. So Sydney has numerous manufacturing industries connected with wool, clothing, leather, machinery, sugar, meat and tobacco. *Brisbane* is situated in a region of constant rains. The Darling Downs are its immediate hinterland, with their eucalyptus forests, sheep-farms, wheat and maize products, tropical fruit growing and dairy works. Brisbane has also the advantage of the Ipswich coalfield and the coal, gold, silver and copper mines in the hinterland. *Adelaide* is situated in a region with Mediterranean climate. In the hinterland wheat is grown on the coastal plains and fruits on the sunny slopes of hills. Dairy farming is carried on in the southern peninsulas. The region is famous for wine and olive-oil. Butter and cheese are among the products exported.

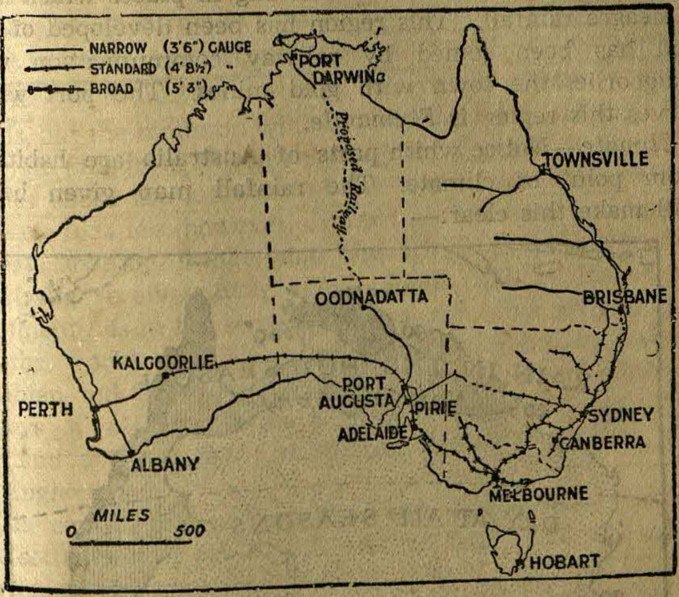


FIG. 149.—Railway Map of Australia.

Notice carefully the numerous breaks in railway gauge. Work out a journey from Perth to Brisbane. How many changes of train are necessary, and where can they be?

The cultivation of oranges and grapes is carried on by the help of irrigation. Though this region is deficient in rainfall, artesian wells can be dug here for irrigation purposes. The forests on the hills in the neighbourhood supply timber for pit-props and railway sleepers. *Perth* is also situated in the Mediterranean region to the south-west of Australia. Here cattle-rearing, dairy-farming, wheat growing and sheep-breeding are the principal industries carried on. Jarrah wood, noted for its strength, is obtained in the neighbourhood. Artesian wells have been dug in places which have a meagre rainfall. This region has been developed of late and has been joined by railway communication with Kalgoorlie, the town with gold mines. The port which serves this region is *Fremantle.*

*Climate.*—Notice which parts of Australia are habitable from point of climate. The rainfall map given below will make this clear:—

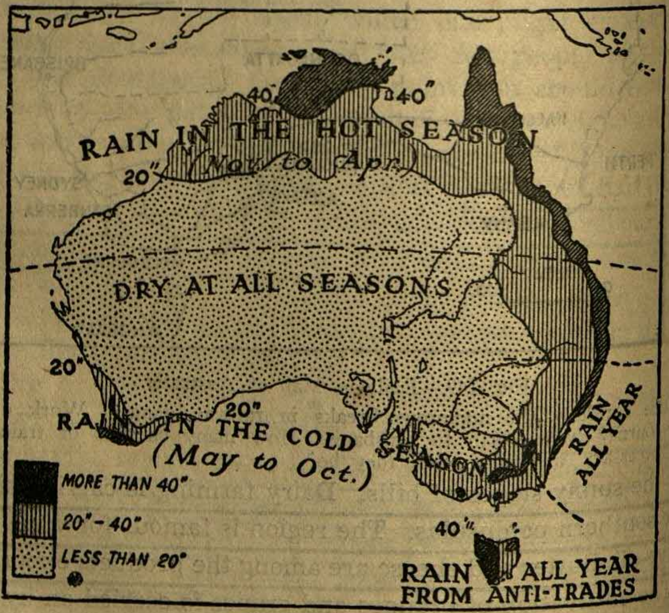


FIG. 150.—The rainfall of Australia.

In the Tropics 20 inches of rainfall may be regarded as roughly a minimum for agricultural development; in the Temperate region 10 inches is sufficient.

Note that Australia is in the Southern hemisphere, and has summer in January and winter in July, so that when people in London celebrate their Christmas with hot puddings, people in Melbourne like to have cold drinks and iced fruits. When the Southern parts of Australia, therefore, receive rain from May to October, they may be understood to have received rain in *winter*. The *Inversion of the Seasons* must be taken into account when studying Southern Continents. The northern shores of Australia are monsoon lands, but the monsoon wind blows from the north-west and the rain falls from November to April. The east of Australia comes under the influence of the South-East Trade Winds. These winds are, however, drained of their moisture by the Great Dividing Range, and the whole of the centre of Australia receives little rain. Again, the centre of the continent lies in the same latitude as the other great deserts of the world—the Kalahari, Atacama, Mexican, Sahara, Arabian and Great Indian Deserts. The south of Australia enjoys a Mediterranean climate. Tasmania and New Zealand enjoy a moist temperate climate very like that of England.

The central part of Australia being a great desert retards the settlement of people and is almost devoid of any means of commnuication except camel-tracks.

Most of Australia has a summer as hot as the hot season of India; but in the south the hot spells are interrupted by the delightful southerly cool winds from the Antarctic. Apart from the fact that a great part of Australia receives little rain, the amount which falls is very irregular. See Fig. 150. In some years there may be no rain at all and the farmers lose a great many of their sheep and cattle, though the danger of water shortage is not as great as it was before the development of the artesian basins.

The deficiency of natural rain water can, fortunately, be overcome in regions of Australia having artesian basins.

In the great region stretching from the south of Queensland through New South Wales into Victoria, the rocks are arranged in the form of basins, and so "artesian wells" can be bored. The water from these wells has enabled large areas of dry country to be formed into rich cattle-rearing and sheep-rearing country.

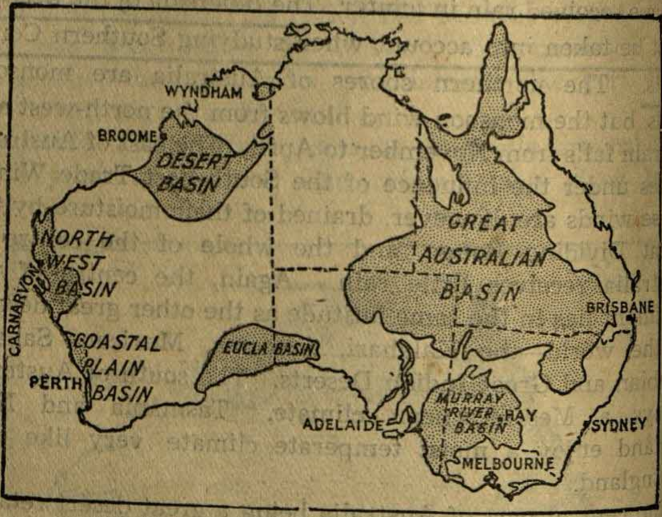


FIG. 151.—The artesian basins of Australia.

The most important is the Great Australian Basin. In some of the others, such as the Eucla Basin, the water is too salt to be of much use.

Sometimes it is necessary to bore to a depth of 5,000 ft. before water is obtained from these wells, and often the water cannot be used for agriculture on account of its being hot and saltish.

**Physical Feautures.**—Australia falls naturally into three physical regions:

(*a*) There is a range of hills and mountains in the East, divided from the sea by a narrow coastal plain.

(*b*) In the heart of the continent there is a great stretch of lowland called the Great Plain.

(c) Occupying the Western two-thirds, there is a broad, flat tableland between 1,000 and 3,000 feet high, with only a narrow coastal plain.

These three regions are shown in Fig. 152.

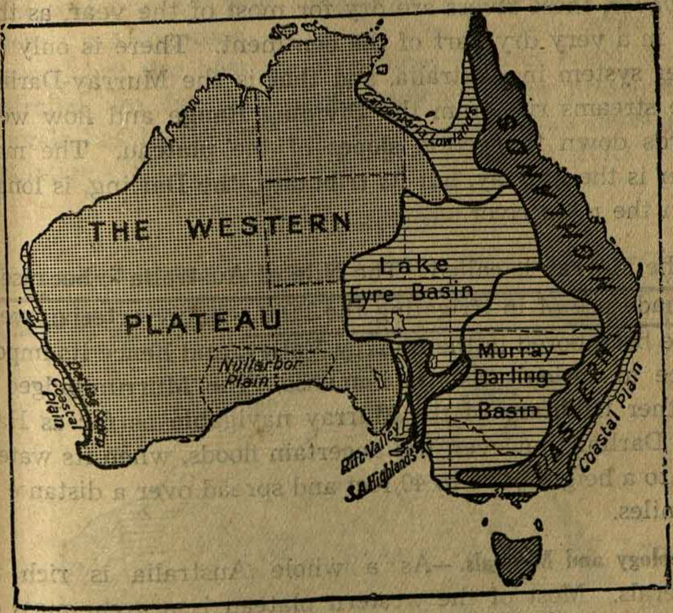


FIG. 152.—The physical features of Australia.

From this map you will see that the central plain has been divided into three divisions, of which the Murray-Darling Basin is the most important. The South Australian Highlands lie between the Murray-Darling Basin and the Western Plateau. But the Eastern Highlands are not folded mountains; they are formed by the edge of a plateau which slopes steeply to the East and gently to the West. These Eastern Mountains are called the Great Dividing Range; the different parts, however, have different names: Blue Mountains in New South Wales, Australian Alps in Victoria.

The gentle slope to the west is a grassland region, of which the Darling Downs of Queensland are famous.

There are many short streams along the East Coast, and some long rivers along the North and West Coasts. Actually, however, these rivers are dry for most of the year, as they are in a very dry part of the continent. There is only one river system in Australia, and that is the Murray-Darling. The streams rise from the Dividing Range and flow westwards down the gentle slopes of the plateau. The main river is the Murray, but its tributary, the Darling, is longer than the main river.

The Murray is called "The Nile of Australia", because it is made use of in irrigating the land. Many artesian wells have been bored in the Murray Valley, and hence its importance to agriculturists is immense. The Murrumbidgee is another tributary of the Murray navigable as far as Hay. The Darling, however, has uncertain floods, when its waters rise to a height of 30 to 40 feet and spread over a distance of 60 miles.

**Geology and Minerals.**—As a whole Australia is rich in minerals. Most of the western plateau is a great mass of crystalline rocks, and in the midst of Western Australia are several famous goldfields, especially at Kalgoorlie. The eastern part of Australia is also rich in minerals. Victoria has the famous goldfields of Ballarat and Bendigo, and copper is important in Queensland. It was the attraction of Australia, though when the rich gold lands became exhausted they turned to farming. In New South Wales is a big isolated hill, known as "Broken Hill," with the richest deposits of silver-lead ore in the world. Both Queensland and New South Wales have good coal, and the great basin in New South Wales (the largest in the Southern Hemisphere) is especially important because it is on the east coast and coal can be loaded almost direct from the mines into ocean steamers. The coal is worked especially near Newcastle (north of Sydney) and south of Sydney. The annual value of the coal raised is now roughly equal to that of all other minerals put together. Australia also has rich deposits of iron ore, but the best, such as those of Iron Knbo, South Australia, are far from the coalfields. The presence of minerals has had great influence on Australia's density of population. Vide Fig. 148 for minerals of Australia.

## NATURAL REGIONS

If you look at the map of Australia, Fig. 153, and compare it with the rainfall map, you will notice how natural vegetation is controlled by the rainfall. Generally speaking, round

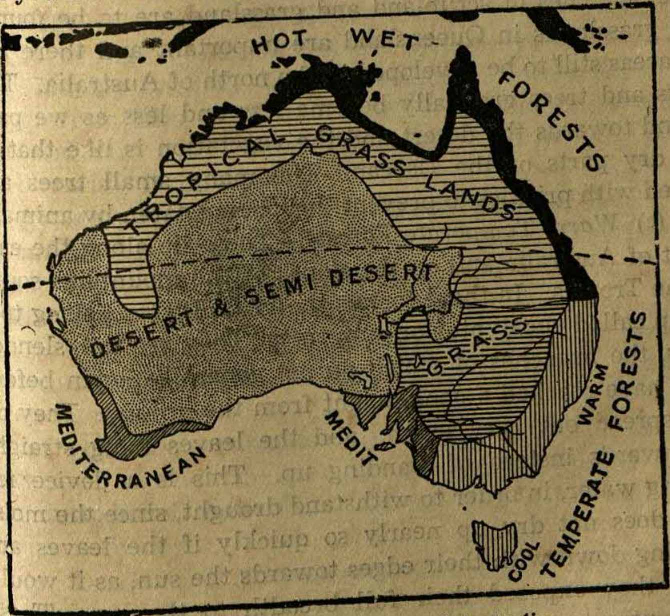


FIG. 153.—Vegetation Map of Australia.

the coast where the rainfall is good, there is forest; inland, where the rainfall is less this forest passes into scrubland, or sometimes into grassland: whilst the rainless heart of Australia is nothing but a great desert. The natural regions of Australia is nothing but a great desert. The natural regions of Australia are:—

(*a*) *Tropical Forests.*—These are found in a fringe along the North Coast where the monsoon rain falls. The forest is often found in patches and in some places it has been cleared. On the coast of Queensland, cotton, maize and sugarcane are important crops grown where the forest has been cleared.

(*b*) *Tropical Grasslands.*—Where the rainfall is low huge stretches of scrubland and grassland are to be found. The grasslands in Queensland are important and there are big areas still to be developed in the north of Australia. The grass and trees gradually become less and less as we pass inland towards the desert and the vegetation is like that in the dry parts of the Deccan. The many small trees are armed with prickles to prevent their being eaten by animals.

(*c*) *Warm Temperate Forests.*—These lie along the east coast of Australia and on the slopes of the mountains south of the Tropics. In these forests the typical trees belong to a group called eucalyptus or gum trees. They are tall, slender trees, the branches of which do not generally begin before they have reached a good height from the ground. They do not spread out very much, and the leaves hang straight downwards instead of standing up. This is a device for storing water, in order to withstand drought, since the moisture does not dry up nearly so quickly if the leaves are hanging down with their edges towards the sun, as it would do if they exposed their full breadth to the sun. These eucalyptus trees are thus able to remain green all the year round, and they do not lose their leaves in winter like the "deciduous" trees of most temperate forests. Some trees of this type have been brought to India and planted round hill-stations. In this eastern region large stretches have been cleared for cultivation, and it is one of the best parts of Australia for farming. In the wetter parts there are good stretches of grass where cattle can be reared, and in the drier parts wheat and oats are grown.

(*d*) *Cool Temperate Forests.*—In the Southern part of Australia including Tasmania, the forests are similar to those we have just described; but the climate is cool, as cool as that of the British Isles, so that fruits which grow in the British Isles, also grow here. But, again, the presence of gum trees makes the country appear different.

(*e*) *Temperate Grasslands.*—Look at Fig. 153 and notice the large area marked "Grass". This is the temperate grasslands region of Australia, and occupies the basin of the river Murray-Darling. These grasslands become poorer as you go from East to West. In the wetter parts there are trees and here wheat farming is possible. In the dry parts sheep-rearing is important.

(*f*) *Mediterranean Regions.*—These regions have very dry summers and warm moist winters; that is, they have a typical winter rain climate, such as we find round the Mediterranean Sea. The natural vegetation here, too, consists of varieties of eucalyptus and in the wetter parts of Western Australia there are some very fine forests. In these forests there are some huge jarrah trees, and still finer Karri, both of which yield valuable timber. Typical Mediterranean fruits such as the vine, the orange and the lemon have been introduced into this part of Australia, and are largely cultivated.

(*g*) *Desert and Semi-Desert.*—Desert and semi-desert occupy the whole of the dry heart of Australia. Surrounding these, there is a broad belt of scrubland.

**Vegetation and Animals.**—There are some specially interesting points to notice about the vegetation and animals of Australia. It is believed that the continent has been separated from other lands for a long, long time, and so its animals and plants are very peculiar. The interesting plants are the eucalyptus trees, of which there are many kinds. In the drier regions they form only scrubby bushes with small leaves. The trees give little shade, because their leaves are arranged vertically. This "mallee scrub" of small eucalyptus bushes covers vast areas. In other places the scrub consists of small acacia bushes very like those in the dry parts of India. In the wetter regions, the eucalyptus trees grow to enormous size and are important for their wood, which is very hard and will not be eaten by white ants. Economically the most important forests are the karri and jerrah forests of the Mediterranean regions of Western Australia and the fine blue gum and other forests occurring on the hill slopes of New South Wales, Victoria, and Tasmania.

The animals of Australia are still more peculiar. There are many kangaroos, which carry their young in a kind of pouch. Still more curious is the platypus, an animal with a beak like a duck and which lays eggs. Then there are big running birds, such as the emu. In recent years European animals have been introduced into Australia. They have increased at an enormous rate—especially the rabbits—for there have been no enemies to worry them. Rabbits are now so abundant that they are a serious nuisance and do great damage. Western Australia has tried to keep out the rabbits by a wire fence 2,000 miles long.

**Industries.**—Australia is a vast land, very thinly peopled as yet, but having a great amount of land waiting development. As one would expect, it is a pastoral and agricultural country.

In 1788, about a hundred and fifty years ago, 29 sheep were imported in Australia. Now there are about 100 millions and they produce the finest wool in the world.

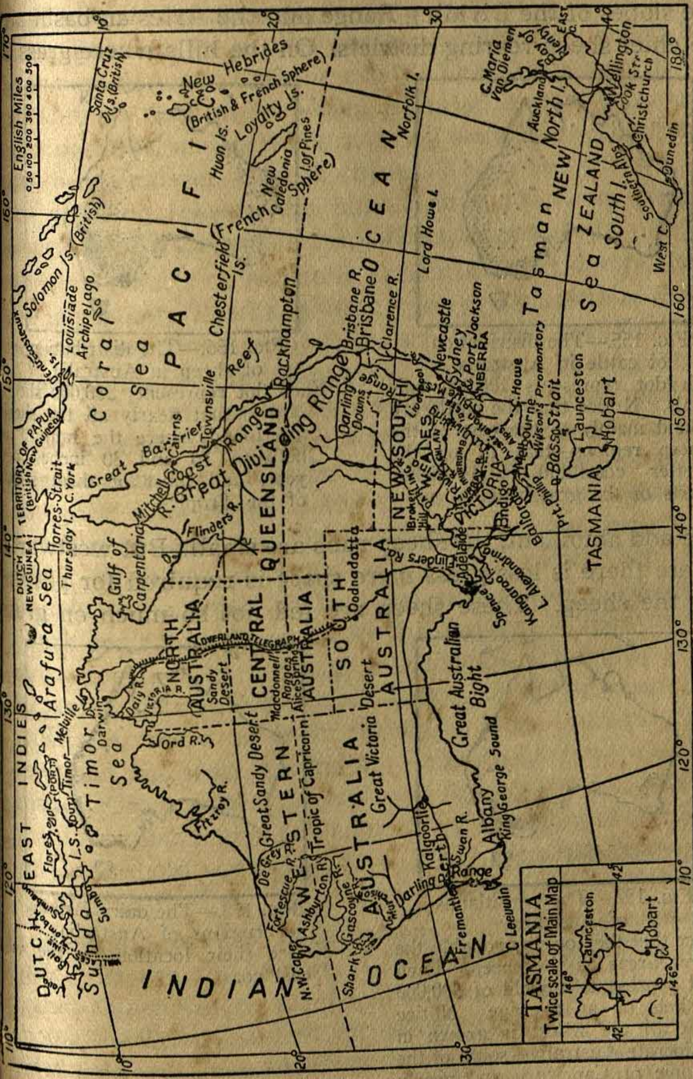


FIG. 154.—Australia (Political).

The slopes of the Dividing Range and the Artesian basin are the chief sheep-rearing districts. On the hills where grass is rich and abundant, the sheep-runs are small. But westward where there is less grass more space is required for pasturing the sheep. These sheep are fed not so much on gras

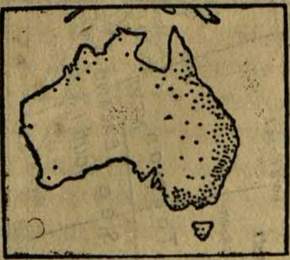


FIG. 155.—The distribution of cattle in Australia.
Each dot represents 100,000 animals. Notice that the cattle are found mainly to the east of the sheep regions—that is, on the wetter coastlands and richer parts of the grasslands.

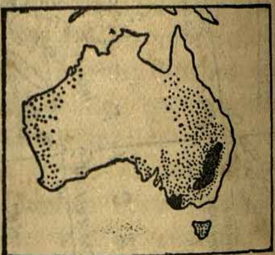


FIG. 156.—The distribution of sheep in Australia.
Each dot represents 250,000 sheep Notice that nearly all the shee are found where the rainfall i between 10 and 30 inches pe year, and most of them sout of the Tropics.

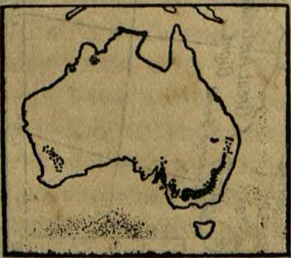


FIG. 157.—The wheatlands of Australia.
Notice that they occupy roughly the same areas as the sheep. Each dot represents a yield of 500,000 bushels on an average. Notice that all the wheat is grown in temperate Australia—south of the Tropic of Capricorn and nearly all where the rainfall is between 10 and 40 inches per year—especially between 20 and 30.

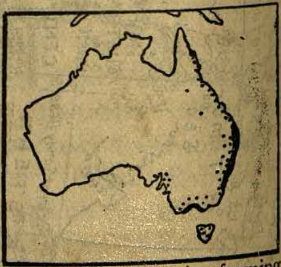


FIG. 158.—The dairy-farming regions of Australia.
Notice their location on the we east coast.

as on a low salt-tasting bush which forms the scrubland. It is also good for them. For pasturing work the owners have to live at the centre of the estate. Their men have to ride miles to see that all the sheep are safe, to drive them on to new pastures, and perhaps to bring back some stray sheep that has wandered from the flock. When the winter is over the shearing season—the busiest time for these people—comes. Then the whole thick fleece is exported.

In other parts of Australia agriculture and dairy-farming are important. The dairy farmer keeps his cattle at a place where grass grows plentifully, for example, on the eastern slopes of the Dividing Range and the coastal plains. On the wetter parts of the western slopes of the Dividing Range there are cornlands where wheat or barley are grown. Cutting the corn, tying it up in bundles, threshing it and putting the grain into bags—all these are done by machines. In the Murray Basin much land is daily opened up for irrigated wheat farming. Recently maize and cotton are being introduced in some parts, Government has a scheme by which some twenty or thirty families are helped to settle down together in a group to cultivate the land. In the Reverina district, New South Wales, in Victoria and South Australia, there is fruit farming. India imports tinned fruit and jam from Australia. Vines are grown and wine is made. Oranges and lemons are largely grown. In Tasmania English fruits, like apples, pears and plums are grown. In Queensland sugarcane, from which sugar is produced, is an important crop.

Australia is rich in minerals. The most important is gold. In the production of this precious metal Australia ranks fourth among all the countries of the world, the first being the Transvaal and the second the United States. The first gold was found in New South Wales at Bathurst, and at Bendigo and at Ballarat in Victoria in 1851. In those days the country was largely unsettled and unexplored, and the gold was found lying on the surface, where it had been washed down by the rivers. Hundreds of people at once came to these places, and this surface gold was soon exhausted, but after that mines were sunk, which are still valuable, especially near Kalgoorlie in the desert part of Western Australia. These are now the most important mines in the continent. They have produced something like £80,000,000 worth of gold since they were discovered in 1891. At present the supply of gold is growing less, and men are going further into the desert to look for fresh goldfields. Silver and lead are found at Broken Hill and Silverton in New South Weles. Copper is found in the north, to the east of Broken Hill and near the shores of Spencer Gulf in the south. There are deposits of tin scattered all down the Dividing Range. It is mined in Queensland, in New South Wales and in Tasmania, which also produces a little copper. Coal is also found in several fields down the east coast of Australia. It is mostly found just where the hills and plains meet. The largest mines are at Newcastle in New South Wales, named after the great English coal port. There is iron also in New South Wales, but hitherto it has been very little worked. Iron ore is obtained from Iron Knob in South Australia.

*Fishing.*—In the warm seas round the northern coast of Australia near Shark's Bay and Port Darwin pearl fishing is an important industry.

## TRADE AND WORLD RELATIONS

Australia, as you must have seen, is more a growing than a manufacturing country; therefore, her chief exports will be food and raw materials, and her chief imports manufactured articles. There is a good deal of exchange between the different States, while New South Wales and Victoria send wheat to all parts. But the external sea-borne trade is very important.

Fig. 159 shows the favourable position which Australia has for carrying on trade with the countries round the Pacific

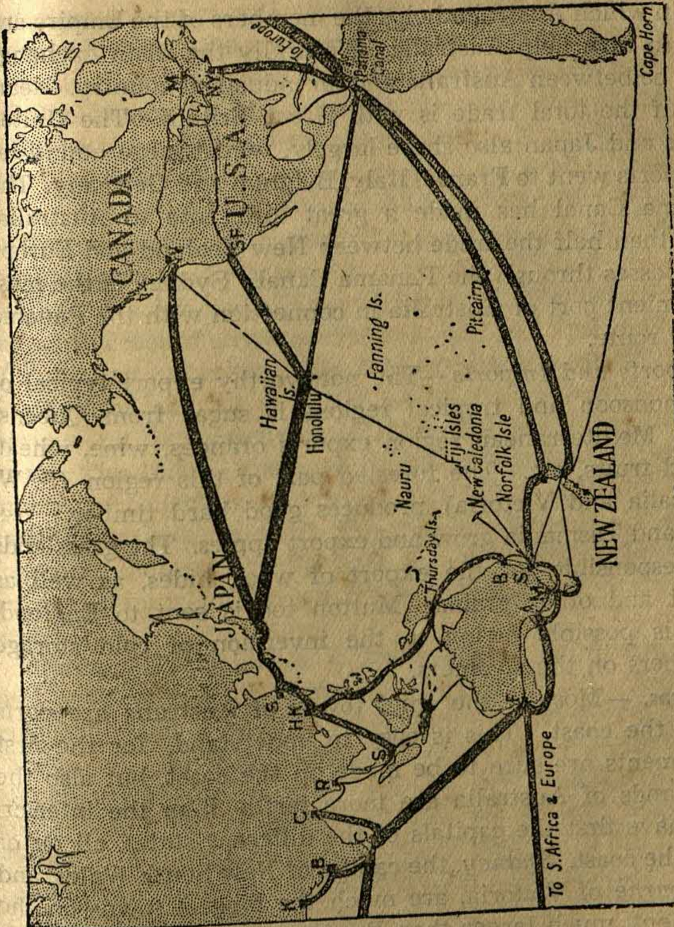


FIG. 159.—Trade Routes of the Pacific Ocean.

and Indian Oceans. A great part of the trade, however, is with Great Britain even though it is far away.

The Australian Government has what is called a "Preferential Tariff System." Goods coming into the country are taxed, but the tax is much less on goods coming from the United Kingdom or Canada or New Zealand. This is one way in which Australia helps the members of the Empire and they in turn help Australia. Naturally the main exchange must be between Australia and an industrial country. Nearly half the total trade is with Great Britain. The United States and Japan also share largely, whilst large quantities of exports went to France, Italy, Belgium and Germany. The Panama Canal has made a great difference to Australia; more than half the trade between New Zealand and Europe now passes through the Panama Canal. Sydney is the most convenient port of Australia in connection with the Panama Canal route.

*Exports and Imports.*—The noteworthy export typical of the monsoon and tropical regions is sugar from Queensland. Mediterranean region exports oranges, wine, wheat, tinned fruits, etc. The forested part of this region (S. W. Australia and Victoria) produces good hard timber. Victoria and Tasmania grow and export apples. The grasslands are responsible for the export of wool, hides, as well as wheat and other grains. Mutton too is sent to England. This is possible owing to the invention of cold storage chambers on the steamers.

**Towns.** —Most of the chief towns of Australia are ports along the coast. This is easy to understand, for the first settlements are sure to be made on the coast, but also the coastlands of Australia are more fertile than the interior. You have first the capitals of the different states, all on or near the coast. *Sydney*, the capital of New South Wales, and *Melbourne* of Victoria, are much the biggest towns on the continent, much larger than Rangoon, with about the same population as Calcutta or Bombay. Next to these come *Adelaide*, capital of South Australia, on the Gulf of St. Vincent and *Brisbane*, capital of Queensland. *Perth*, the capital of West Australia, is so far the smallest of the State capitals. But this part of the country is becoming more and more settled and cultivated, and it seems likely that more and more steamers will use the port of *Fremantle* close to Perth, which has the advantage of being nearest to England in Australia. As before stated, *Canberra* is the capital of the whole country. This is *not* on the coast, but on the hills of the Dividing Range, near the borders of New South Wales and Victoria. It is important only as the seat of Government. There are two or three other ports on the east coast chiefly connected with mining industries—*Townsville* and *Rockhampton* in Queensland for gold, and *Newcastle* in New South Wales for coal. West of Adelaide, the only town on the south coast of any importance is *Albany*. This is because of the steep unbroken cliffs that border the whole of the Great Bight, and the very dry nature of the country. *Port Darwin* and *Derby* serve as ports for the tropical north-west coast. The inland towns of importance are either mining centres, or collecting centres for agricultural produce. You have *Kalgoorlie* amongst the mining towns in Western Australia, *Ballarat* and *Bendigo*, centres formerly important for gold mining in Victoria, *Broken* Hill for silver in New South Wales.

**Tasmania.**—Tasmania is a small island about the same size as Scotland or Ireland, lying south of Australia. Physically it is a mass of mountains and hills with fertile valleys. In the highlands are some mineral deposits—copper, silver, lead, gold, and tin—notably at Mt. Lyell, Mt. Zeehan, and Mt. Bischoff. It has a healthy temperate climate. In the valleys wheat, barley and fruits are grown. Tasmanian apples are particularly fine. The principal town is *Hobart; Launceston* is the chief port. Sheep-rearing and cattle-breeding is carried on in the vicinity.

## NEW ZEALAND

The Dominion of New Zealand consists of two large islands and a number of smaller islands in the South Pacific

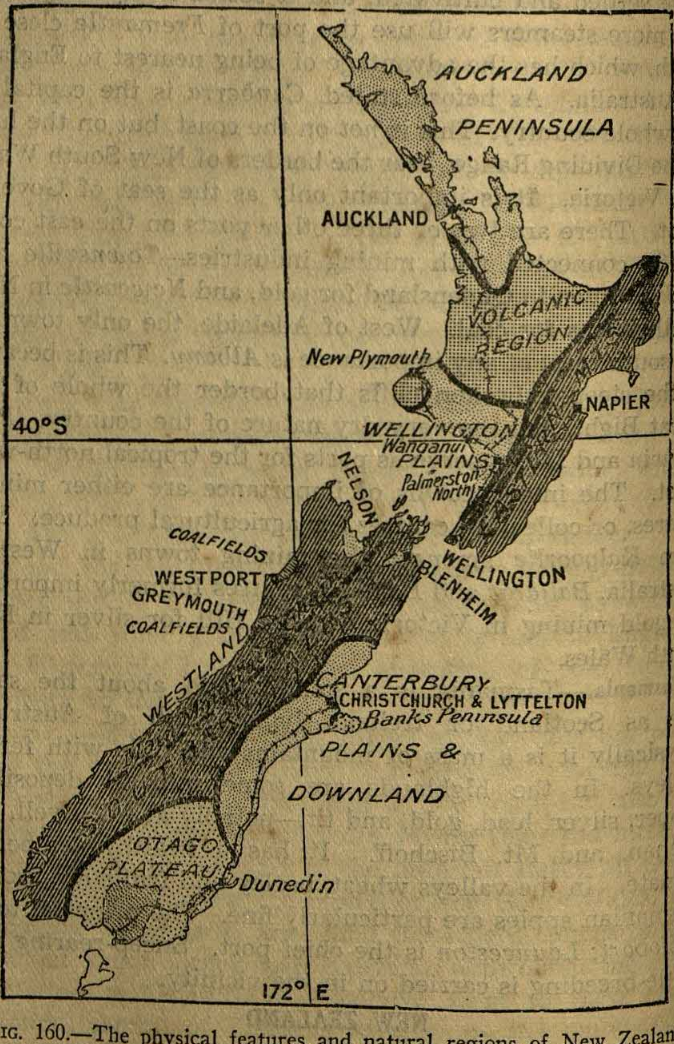


FIG. 160.—The physical features and natural regions of New Zealand. The more important plains which lie amongst the mountains or plateau lands are shown separately.

Ocean. Its climate is mild and healthy. So it has become the health resort of people who desire rest. It is called the Switzerland of the South. Its area is a little less than the British Isles. Running through the two main islands is a mountain backbone. In the South Island the backbone (Southern Alps) is near the west coast and the plains are on the east; in the North Island the backbone is nearer the east and the plains are on the west. This has a tremendous effect on the climate especially as the mountains in the South Island are so high (up to 12,000 feet in Mount Cook) that they are always covered with snow. In the Northern Island there is a large central area of volcanic rocks and several isolated volcanoes.

**Climate.**—Except the extreme northern end, which is in the same latitude as Spain and has a Mediterranean climate, the whole of New Zealand falls in the Westerly Wind Belt. Hence there is a heavy rainfall on the west of the islands and a low rainfall on the east.

**Natural Regions.**—(a) *The Mountains of the South Island.* —Most of the region with heavy rainfall—unless it is too high—is forested; mountain pastures suitable for sheep occur in places, and especially in the drier parts to the north-east. Mining is not now an important occupation, though gold occurs as well as coal, copper, and New Zealand green-stone. The coal is obtained mainly in the vicinity of what poor, supports large numbers of sheep.

(b) *The Grasslands of the South Island.*—In the south, grass covers much of the Otago Plateau and although somewhat poor, supports large numbers of sheep.

Oats are grown. Notice the association of oats with poorer colder land and wheat with warmer richer land. This district is served by the port of Dunedin. The Canterbury Plains and Downland, farther north along the east coast, are the richest part of the South Island. In the old days sheep were kept for the sake of their wool, but now huge quantities of frozen lamb and mutton are sent to Britain, and sheep which produce both good wool and good mutton must be fed on good grass. As a result, much of the grass now grown is of the best English kinds. Wheat and garden produce are grown. The principal town in this region is *Christchurch;* eight miles away is its port, *Lyttelton.* Near Christchurch is the fertile Banks Peninsula, producing some of the butter and cheese for which New Zealand is now famous. Special mention must be made of the sheltered lands around Tasman

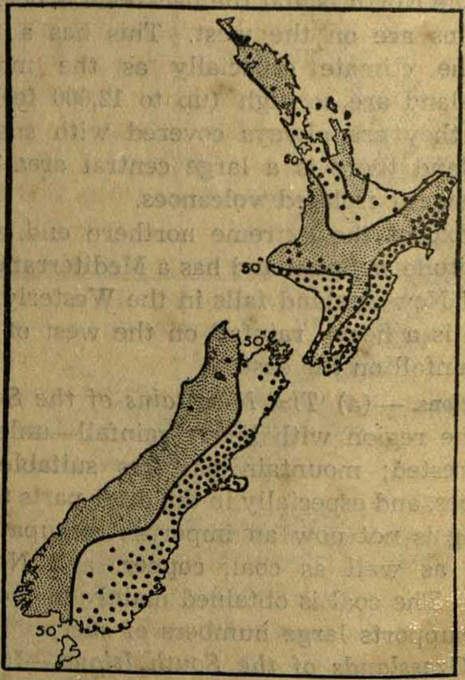


FIG. 161.—The distribution of sheep in New Zealand.

Each dot represents 100,000 sheep. Notice that nearly all the sheep are found where the rainfall is less than 50 inches.

Bay (centre, Nelson) and Marlborough Province (centre, Blenheim) at the northern end of the South Island.

(c) *The Mountains of the North Island.*—Here the mountains are lower and on the drier side of the island. This region is very varied but has much downland suitable for sheep. *Napier* is the port serving this region.

(d) *The Auckland Peninsula.*—This narrow peninsula enjoys a warm, almost Mediterranean climate, and fruits such as the vine, orange, and lemon can be grown. Grass suitable for cattle will grow well, and this is one of the great dairy-farming areas. Forests of Kauri pine occur in this region, and the collecting of gum from these trees is an important industry. Gold is also found. *Auckland,* the largest town in New Zealand, is situated on a very narrow part of the peninsula and so commands both coasts. It is a port of call for steamers between Australia and America—especially from Sydney to Vancouver.

(e) *The Volcanic Regions of the North Islands.*—In the centre of this region hot springs and geysers occur, and it is not long since volcanoes were active. Earthquakes are still common. The soils are often dry and poor.

(f) *The Wellington Plains* occur to the south of the volcanic region and form one of the chief dairying regions. *New Plymouth, Wanganui,* and *Palmerston North* are centres of the dairying industry. *Wellington,* the capital of New Zealand, lies at the southern end of the mountains of the North Island and to the south of the dairying region.

**Trade and Communications.**—What we said about the trade of Australia applies almost exactly to New Zealand. New Zealand lamb, wool, butter, and cheese are much in demand in England and always of a good quality. The quality of the butter and cheese compare more than favourably with that of Danish products. The four staple exports, wool, mutton, butter, and cheese, form the greater part of the trade. A very large proportion goes to Great Britain *via* the Panama Canal. Eighty per cent of the exports go to Great Britain, which supplies over fifty per cent of the imports.

**New Guinea.**—The island of New Guinea is situated in the Equatorial region, and the lowlands are covered with hot wet evergreen forests. The interior is occupied by a plateau, said to be covered with dense grassland. The inhabitants of New Guinea are wild cannibal tribes, and the interior of the island is still little known. The eastern half of the island is part of the British Empire, the western half forms part of the Dutch Colonies of the East Indies.

### PACIFIC ISLANDS

Scattered over the surface of the Pacific Ocean are a number of small islands. Most of them are coral islands, or volcanic islands surrounded by a coral reef. Cocoanuts flourish on nearly all the islands and are sometimes the only large plants. The following are some of the more important groups. Vide Fig. 159, p. 321.

**Under New Zealand.**—The Western Samoa Islands are administered by New Zealand, and export copra and cacao beans. The Cook Islands, attached to New Zealand in 1901, have similar exports; and so also the Union Group. Nauru or Pleasant Island is important owing to the rich deposits of phosphate, sent to Great Britain, Australia, and New Zealand.

**The Hawaiian Islands.**—These belong to the United States. The principal town, *Honolulu,* is a large city and an important port of call for ocean liners crossing the Pacific. The islands are famous for their pineapple plantations; the tinning and export of pineapples is now a large industry. There is a famous active volcano, Mauna Loa.

**The Fiji Islands.**—These belong to the British Empire, and lie on the trade routes between Australia and New Zealand on the one side and Canada and the United States on the other.

**New Caledonia.**—This is a French possession, formerly used as a convict settlement. It has large deposits of nickel ore.

Some of the tiny islands of the Pacific are used as "signal stations." They are equipped with wireless apparatus and pass on messages received from ships. Examples of islands used for this purpose are Thursday Island, Norfolk Island, Fanning Island, Ocean Island, etc.

## ANTARCTICA

The barren Antarctic continent consists probably of a high plateau of land, but is covered to a great depth by ice and snow. Under the name of the Ross Dependency a large sector has been placed under the Government of New Zealand. The whale fishing industry is one of great value in the territorial waters and is being exploited mainly by Norwegians under licence from the New Zealand Government.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches etc.

1. Describe the situation and account for the importance of five of the following towns:—Adelaide, Auckland, Fremantle, Honolulu, Melbourne, Wellington, Port Darwin, Kalgoorlie, Sydney.
2. From what Australian ports are the following exported:—Wool, fruits, wheat, wine, sugar, gold, coal, silver?
3. Explain:—
    (1) How the opening of Panama Canal has affected Australia.
    (2) Why sheep are chiefly kept to the west and cattle to the east of the Dividing Range.
    (3) Why the Chinese and Japanese want to come into Australia, when the white Australians want to keep them out.
    (4) Why the population is thicker on the east than on the west coast.
    (5) Why Australia observes Christmas in summer. (B. U. 1931)
    (6) Why New Zealand exports meat. (B. U. 1927).
    (7) Why in Australia there are some remarkable things not found in other parts of the world.
4. Write notes on:—
    (1) Communications and trade between India and Australia.
    (2) Settlement and development of Australia.
    (3) Mineral resources of Australia.

5. Compare and contrast the Murray-Darling basin with that of the Ganges-Brahmaputra.

6. Give a geographical account of New Zealand. (B. U. 1931 & 1934)
Compare it with (*a*) the British Isles, (*b*) Japan.

7. A traveller from Adelaide wants to go to England. By what different routes can he make that journey? Which route should he choose if he wants to reach England in the shortest time?
(A. V., M. S., Bur., 1924)

8. Write an account of "the occupations of the people of Australia" using the headings:—

(1) Sheep-rearing—where it is carried on—the difficulties the people have to deal with—what products are obtained from the sheep and sold.

(2) Crops grown—names of things grown and where they are grown.

(3) Minerals—names of minerals—where they are found.

Illustrate your answer with a sketch-map.
(A. V., M. S., Bur., 1925)

9. Describe the possibilities of agriculture owing to the boring of artesian wells in Australia.

10. How has the inversion of the seasons in Australia affected the world-trade of wheat and fruits?

## CHAPTER XXIII

## AFRICA

In the last chapter we studied geographical conditions in a continent which lies to the south of the equator. We saw how natural vegetation depends on climate and how the density of population is affected by climate, vegetation and the possibility of carrying on occupations suited to particular regions. Great similarity of geographical conditions is observed in the case of those parts of South America and Africa lying to the south of the equator. There is a regular repetition of equatorial hot wet forests (Fig. 62), tropical glasslands (Fig. 68), deserts (Fig. 64), Mediterranean regions (Fig. 65) and temperate forests (Fig. 67) in each of the three continents. This uniformity is worth noting. This accounts for the similarity of occupations amongst people living in the southern continents.

Coming to Africa we see that it is the only continent which is also cut in half by the equator. Africa has been described as the *"Dark Continent"*. No doubt Africa remained unknown to civilized nations on account of its unindebted coastline, river courses obstructed by falls, unhealthy climate and inhospitable deserts. In spite of all these unfavourable circumstances this continent has attracted the attention of European nations who, on account of its equatorial forests, arable land, pasture and Mediterranean regions, look upon it as a *Land of Possibilities,* and there is a regular scramble for mastery.

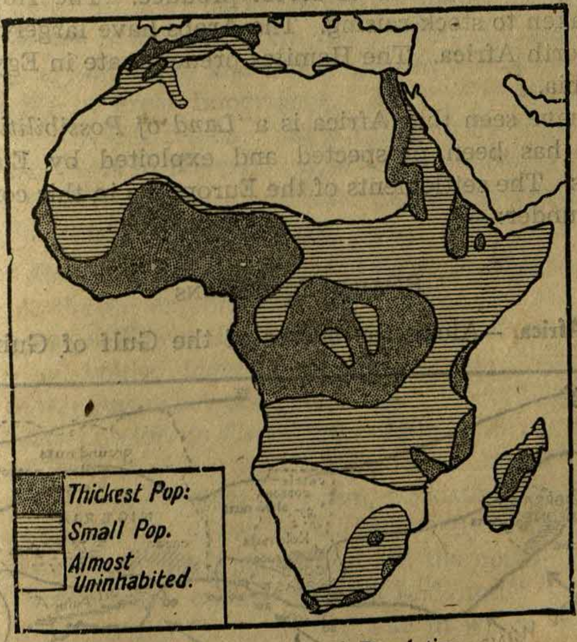


FIG. 162.—Density of Population.

Let us take account of the portions of Africa that are habitable. Study carefully Fig. 163, wherein you will find that density of population is noticeable in the valley of the

Nile; in the Mediterranean regions near the Cape of Good Hope, Tunis and Morocco; in the forested regions of East and West Africa and in the Savanna regions. The deserts of Sahara and the Kalahari are naturally thinly populated on account of their adverse climate.

**Peoples.** —Negroes inhabit tropical West Africa, Sudan and the grassland south of the equator. The Pygmies inhabit the Congo Forest. The Bushmen are short in stature and inhabit the Kalahari scrubland. The taller Hottentots occupy better regions. The Negroes are agricultural and pastoral people, while the Bushmen and Pygmies are hunters and collectors of forest produce. The Hottentots have taken to stock-raising. The Arabs have largely spread over North Africa. The Hamites predominate in Egypt and Abyssinia.

We have seen that Africa is a *'Land of Possibilities'* and that it has been prospected and exploited by European Nations. The settlements of the Europeans in this continent are as under:—

## BRITISH POSSESSIONS

**East Africa.** —Along the shores of the Gulf of Guinea lie

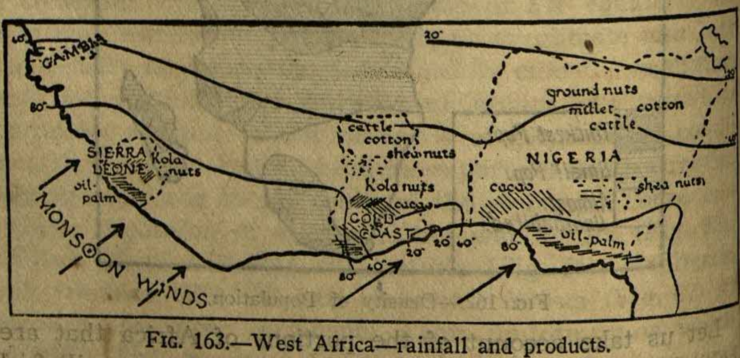


FIG. 163.—West Africa—rainfall and products.

four British possessions of Gambia, Sierra Leone, the Gold

Coast and Nigeria. The hills and the plateau region consists of minerals, of which tin (Nigeria), gold and diamonds (Gold Coast) are famous. Coalfields have been recently exploited. Since there are hills quite close to the coast, rainfall decreases rapidly as one goes inland. Near the Coast is a belt where the natural vegetation is equatorial forest, from which Mahogany and other cabinet woods are obtained. At a few places along the coast where the land is cleared, rice is an important cereal crop, but elsewhere oil palm is the leading crop. Just behind the coastal belt the Cacao tree is grown in quantity. Farther inland kola nuts are grown. In drier parts are grown Shea-nuts, from which Shea butter is obtained. On the plateau the cultivation of cotton, ground-nuts, and other oil-seeds is carried on and cattle are of great importance. Road and rail have been developed in this region. Lagos and Port Harcourt are two principal ports in Nigeria. Tacoradi in the Gold Coast is a fine harbour. Free Town, Accra, Lagos and Port Harcourt are important harbours on the coast.

**West Africa.** -It was the dream of Cecil Rhodes that British territory should extend from the Cape of Good Hope right up as far as Egypt to the north and that the territory should be welded together by the Cape-to-Cairo railway. The railway has never been completed. Aeroplanes on their way from London to Cape Town follow almost the same route which was planned by Rhodes for his Empire Railway. Egypt is an independent kingdom, consisting essentially of the narrow, fertile valley of the Nile, only some ten miles wide, with its crowded population. In the north-east corner is the Suez Canal, opened in 1869 and under the control of an International Company but one in which the British Government is a principal shareholder. There is a strong British influence in Egypt and also a strong military force.

South of Egypt, on either side of the Nile, lies the large territory of the Anglo-Egyptian Sudan, a land of plains within the tropics, and so tropical in character, and watered by the White Nile and the Blue Nile. These two branches of the Nile unite below Khartoum. The northern part of

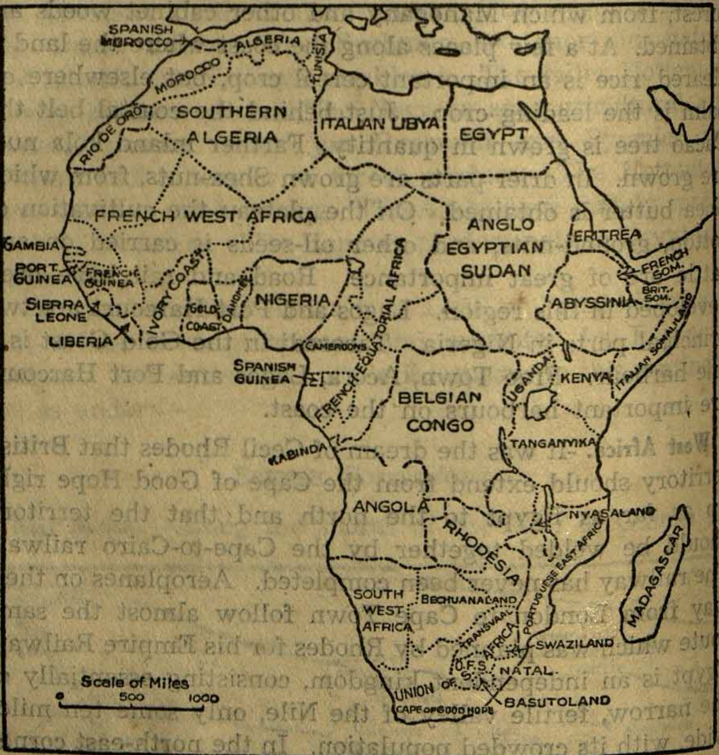


FIG. 164.—Africa (Political).

the Sudan is semi-desert and much of the South-West is a great swamp—*the Sudd*. The important region is in the neighbourhood of Khartoum, where irrigation works have rendered fertile a vast tract of country important for the growing of cotton. The Anglo-Egyptian Sudan is under the joint control of Britian and Egypt.

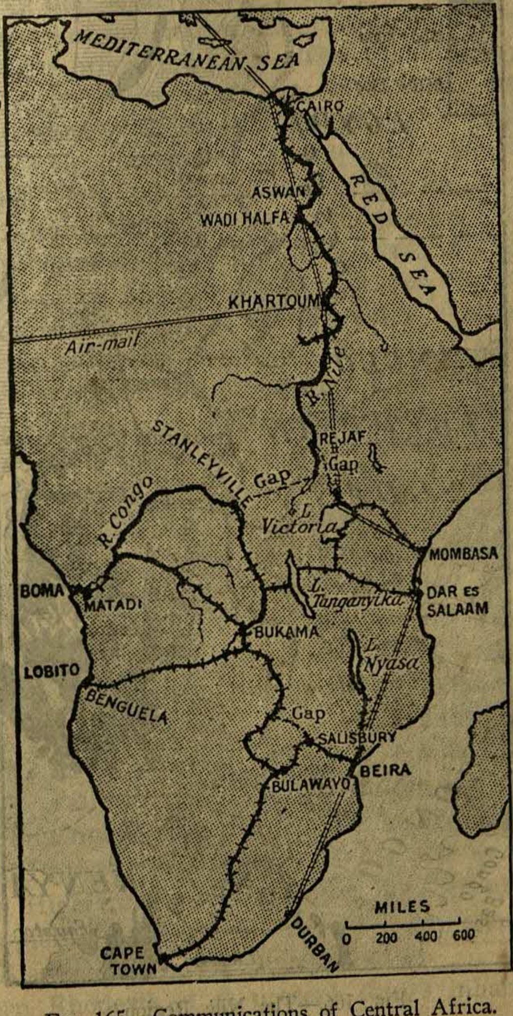


Fig. 165.—Communications of Central Africa.

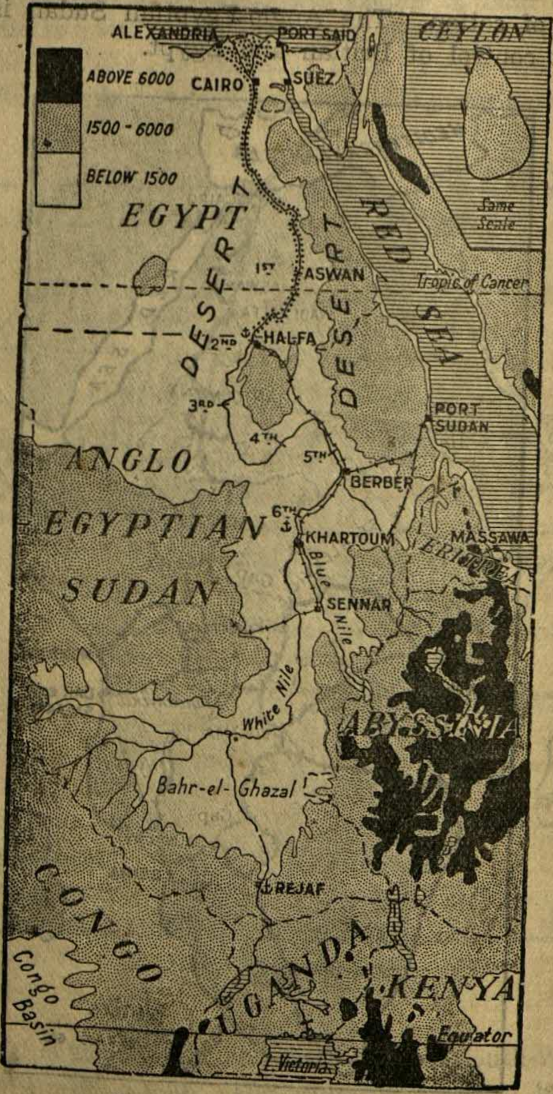


FIG. 166.—The Nile Region.

British Somaliland, a dry tract producing gums and some hides and skins, lies south of the Gulf of Aden.

South of the Sudan, on either side of the equator, and with no coast line, is the colony of Uganda. The cultivation of cotton is one of the leading occupations. Ivory, tin, hides and skins are other products. The plantation products are coffee, sugar, tobacco, tea and wheat. To the east of Uganda stretches the colony of Kenya. The coastal plain does not receive an adequate rainfall and is largely desert and deserted. The plateau of Kenya is high and has a genial climate. Despite its situation on the equator, there are large tracts suitable for white settlement. Cotton, coffee and various other crops are cultivated for export by the white settler. The interest of the native is in extensive herds of poor cattle and crops of millet. Dairy farming and the production of wool are progressive industries. Oilseeds, maize, sugar, cotton and cocoanuts are grown on the lower slopes. Nairobi is the chief city and centre of white settlement. Mombasa has a very fine sheltered harbour.

South of Kenya is the large mandated territory of Tanganyika, formerly German East Africa. It is not as suitable for white settlers as Kenya is. There are about eight thousand Europeans. The chief exports are sisal, cotton, coffee, ground-nuts, hides and skins. Sisal and coffee are grown on the highlands. Cotton plantations are on the coastlands. They are managed by the whites. Oil palms occur near lake Tanganyika. Dar-es-Salaam is the principal harbour. A railway runs from Dar-es-Salaam to Kigoma on lake Tanganyika with a branch to Lake Victoria. The Nyasaland Protectorate contains about 18,000 Europeans on the Shire Highlands. Coffee, cotton, tobacco and tea are grown as plantation products. Zomba is the administrative centre. Blantyre is the commercial centre.

Northern Rhodesia is at present thinly inhabited by a

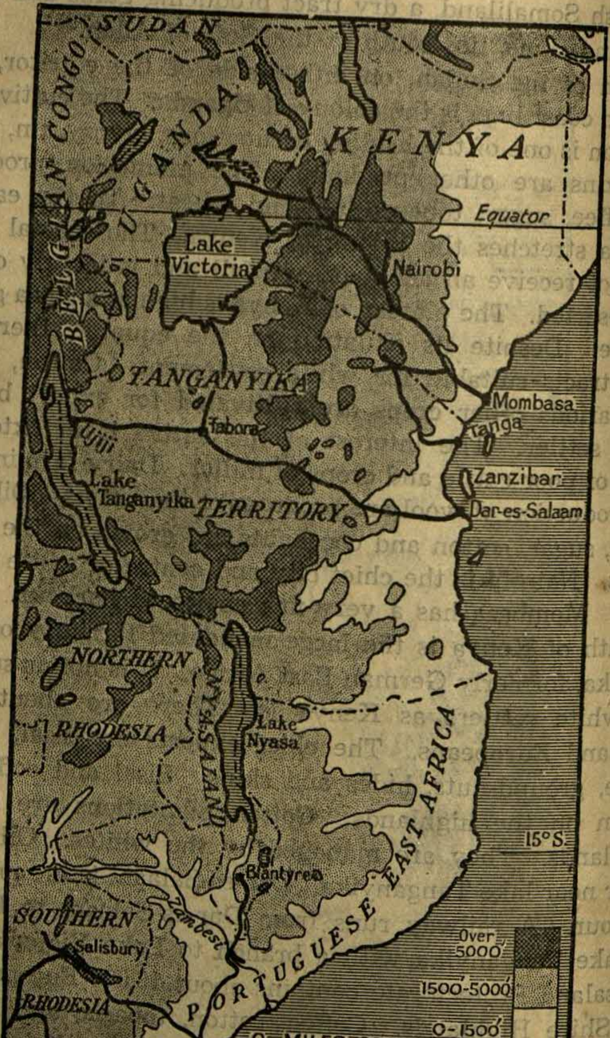


FIG. 167.—Map of East Africa.

handful of white people. It is a savana country full of possibilities because of its copper mines. Cobalt, zinc, vanadium, gold, manganese and lead are also found. The chief mining centre is Broken Hill. The highland is suitable for farming and there are areas of good arable land. Maize, tobacco, wheat and coffee are the chief products. Livingstone near the Victoria Falls was the former capital, the present capital being Lusaka. Fort Jameson, even though it is away from railway communication, has an increasing trade in cotton and tobacco.

**Southern Rhodesia.**—The Zambezi separates Northern Rhodesia from Southern Rhodesia. Nearby are the famous Victoria Falls. Just below the Falls the great gorge is spanned by a bridge carrying both road and rail. In 1935, the first move was made in the construction of power works at these, perhaps the greatest of all the waterfalls in the world. That part of Southern Rhodesia which lies more than 3,000 ft. above sea-level is suitable for white settlement. This region is infested by the tse-tse fly to a lesser degree than is Northern Rhodesia and hence cattle are reared in great numbers here. Maize, tobacco, cotton, ground-nuts, sunflowers (for oil), lemons and oranges are the principal products of this region. Salisbury and Bulawayo are famous dairy-farming centres of S. Rhodesia. Gwelo is the centre of the gold and diamond mining of the province. Wankie has coal mines. Other metals found in this region are chrome, iron ore and asbestos. The inland situation of the region is a great handicap. It necessitates the using of varied outlets like the side-door to the Atlantic through Angola, or the southern route to the Union, or the route to the east through the Portuguese port of Beira.

**The Union of South Africa.**—In 1910 the Union of South Africa was constituted a Dominion of the British Empire and was formed by the union of the four colonies, now the four provinces of the Union—the Cape of Good Hope, the Orange

Free State, Natal and Transvaal. The large mandated territory of South-West Africa, formerly German South-West Africa, is now included under the administration of the Union. The neighbouring protectorates of Bechuanaland, Swaiziland and Basutoland are under Imperial protection.

The Union proper lies almost entirely outside the tropics; only the northern part of Transvaal is a tropical country. The rest is in Temperate latitudes. Partly for this reason and partly because of the elevation above sea-level, the country is particularly suitable for white settlement.

**Minerals.** —Gold is found in great quantities in a ridge of hills, known as the Witwatersrand or more shortly, the Rand, that runs across the Transvaal in South Africa. From this goldfield something like half the gold in the world is produced. Diamonds are also found in South Africa. The most important fields are at Kimberley just within the borders of the Cape Province, south of the goldfields. Some coal mines are on the eastern edge of the Drakensberg Mountains in Natal and near the Transvaal goldfields. From Newcastle coal can readily be sent on a downhill journey to the port of Durban.

The south-west corner of the Union comes under the influence of a Mediterranean climate, and has the characteristic production of Mediterranean fruits. The remainder of the Union lies within the Trade-Wind belt, the winds blowing from the south-east. The coastal strip is thus marked by rich pastures, dairy-farming, sugar and maize cultivation. On the eastern half of the plateu the rainfall is sufficient for the growth of grass and cereals. As one passes to the western half of the plateau the conditions becomes drier and drier. The coastal strip of South Africa on the Atlantic coast is drier than the Kalahari Desert.

**Population and Settlement.**—In the 15th century the coast of South Africa was merely important as a calling place and watering place for vessels on their voyage to India round the Cape of Good Hope. This route was important to the Portuguese traders and later to the British, but particularly to the Dutch. The early settlement around Cape Town was Dutch, and later the gold attracted white men to what is now the Orange Free State and the Transvaal. The British settlement had a particular focus in Natal. The clash of interests came to a crisis in the Boer War of 1899-1902. After the peace, however, the two peoples have worked side by side amicably and have welded themselves together into a South African nation. The Union of South Africa is bilingual, the two languages being Afrikaans (the South African form of Dutch), and English. The Afrikaans-speaking people are farmers on the Veld. The population of British origin tends to be concentrated in towns.

**The Cape of Good Hope.**—The Cape Province is the chief producer of wheat, wool, fruits, wine and diamonds. Cape Town is the principal town of the province. It is the chief passenger and mail port. It is an important port of call for ships going to Australia and New Zealand by the Cape route. Cape Town is an artificially protected harbour and is the centre of whaling and fishing industries. Port Elizabeth is a well-equipped harbour. It exports wool, mohair, ostrich feathers and fruits. East London is another port of importance exporting wool and mohair.

**Natal.**—Natal has a warm temperate oceanic climate. Sugar, tea, pineapples and other fruits are grown here. The Drakensberg Highlands have rain throughout the year. They have, therefore, the richest forests and land suitable for stock-rearing. Between the highlands and the plains is the middle zone in which wheat, tobacco, kaffir corn, maize and wattle are grown and cattle and sheep are reared. Pietermaritzburg is the administrative centre. Durban is the largest town and the chief port of the province. It exports coal, maize, wool, hides, sugar and gold.

**The Orange Free State** is situated on the High Veld and is a pastoral country. Agriculture is carried on in the East where wheat and oats are grown. The chief town is Bloemfontein. Kimberley has the most famous diamond mines in the world and is the chief town of Griqualand West.

**The Transvaal.** –This province is situated on the High Veld and the Bush Veld.[1] The slopes of the plateau are suitable for agriculture and produce maize, wheat, tobacco and fruits. Pretoria is the administrative centre of Transvaal and the whole of the Union. Johannesburg is the largest town and gold mining centre. Ostrich feathers were in great demand in former times, but trade in them has dwindled as they are no longer regarded as an article of fashion.

**South-West Africa.**—The coastlands are deserts, but the higher lands permit pastoral occupations. The country is rich in diamonds and copper. Walvis Bay is the chief port, and Windhoek the capital.

## FRENCH POSSESSIONS

The African possessions of the French are:—Algeria, Tunis, Morocco, French Equatorial Africa, Senegal, French Guinea, the Ivory Coast, Dahomy, Niger, Chad, Madagascar, Reunion and French Somaliland. Togo and Cameroon were mandated to France after the last World War (1914-1919).

Algeria and Tunis are countries with a Mediterranean climate. The coastal tracts have a good soil, but require irrigation. Wheat and barley, vine and fruits are grown.

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[1] Veld is the name given in the Transvaal to elevated grassy plains which form part of the great South African plateau. It varies in height from 2,000 ft. to 6,000 ft. above sea-level and consists of rolling, grass covered, treeless downs.

The hills are covered with forest including cork-oak, pine and cedar. Sheep are reared high up on the hills. The minerals of these areas are important to France. Iron ore and phosphates are mined in quantity in Algeria. Large coal-fields await development farther south. Esparto grass found in this region is used in paper making. Algiers is the chief town, capital and port. Oran is another important port. The capital of Tunis is Tunis.

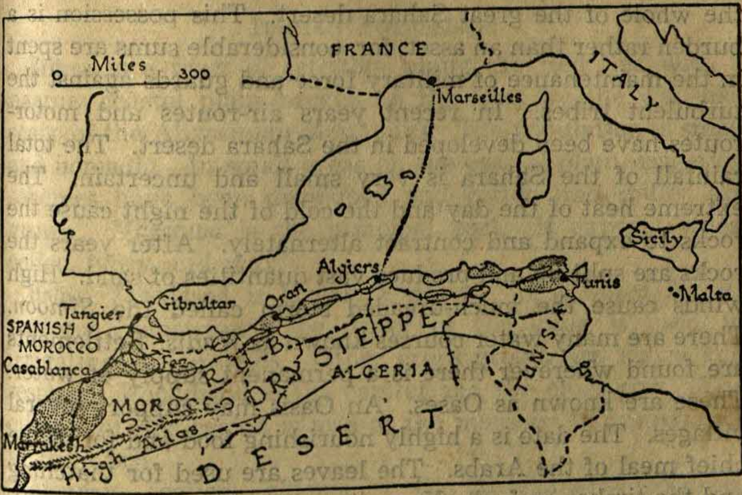

FIG. 168.—North Africa.

**Morocco.**—France has paramount influence over the kingdom of Morocco. The Northern strip, except the small territory round Tangier, is under Spain. The town of Tangier is controlled internationally by France, Spain and Britain. Agriculture is the chief occupation of the coastal plain and near the foothills. Irrigation is carried on in many places. Large numbers of sheep, goat and cattle are raised on the plateau. The chief mineral is phosphate, used as a fertilizer. It is an important article of export. Casablanca is the chief port. Marrakesh is the market centre of the plateau. The capital of the country is Fez.

**Sahara.**—France possesses, at least nominally, practically the whole of the great Sahara desert. This possession is a burden rather than an asset; for, considerable sums are spent in the maintenance of military force and guards against the turbulent tribes. In recent years air-routes and motor-routes have been developed in the Sahara desert. The total rainfall of the Sahara is very small and uncertain. The extreme heat of the day and the cold of the night cause the rocks to expand and contract alternately. After years the rocks are split up and produce vast quantities of sand. High winds cause the much-dreaded storm called the *Simoon*. There are many water courses known as *Wadis*. Settlements are found wherever there is a permanent supply of water. These are known as Oases. An Oasis may support several villages. The date is a highly nourishing food and forms the chief meal of the Arabs. The leaves are used for thatching and the timber as fuel. Nomadic pastoral people roam with their herds near the fringes of the semi-desert and the Oases.

**French West Africa.** —Along the wet coastal strip cocoa is produced from the bean of the cacao tree, and rubber plantations have been started. Farther inland cotton, groundnuts and vegetable oil are produced. **French Equatorial Africa** produces rubber and cocoa, but the tract is as yet comparatively undeveloped. *Brazzaville* is the chief town and capital.

**Madagascar,** a large island off the south-east coast, contains some minerals; it is little developed.

## FORMER COLONIES OF GERMANY

Prior to the World War (1914-1919) Germany had the following colonies in Africa: (1) Togoland, (2) Cameroons,

(3) East Africa and (4) South-West Africa. The first two are under the League Mandates of Britain and France; the third under that of Britain and Belgium; and the last under British Mandate alone.

### ITALIAN POSSESSIONS

**Eritrea** is a tract of territory along the Red Sea with a narrow coastal plain backed on the west by the wall-like scarp of the Abyssinian Mountains. The population is small and nomadic. In small areas on the coastal plain irrigation schemes have been developed and cotton and millet are grown. *Massawa* is the principal port. It exports hides, coffee, ivory and wax.

**Italian Somaliland** is largely a desert. It is noted for its pastoral industries. The water of the Juba is used in irrigating cotton-fields. Other crops grown are maize and sesame. *Mogadishu* is the capital and the chief port. The climate of this region is arid as the monsoon blows parallel to the coast.

**Abyssinia** (called *Ethiopia* by the Abyssinians) occupies a knot of mountains in north-eastern Africa. Italy annexed it in 1936. 'The Negus' (Emperor) fled to England, until he was restored to his kingdom in 1941. The chief town *Addis Ababa* is reached by railway from the port of Jibuti in French Somaliland. The south-east is largely desert, but the centre and west have mountain valleys capable of greater production.

The highland is surrounded by a ring of deserts in the south, east and north. It, however, receives a heavy monsoon rainfall, which causes the Nile floods. The tropical region produces coffee, cotton, sugarcane, and a little rubber. Mediterranean fruits like vines, olives and crops like wheat and barley are raised in the warm temperate region between 5,000 to 8,000 feet where most of the inhabitants live. The higher lands are used for pasture.

## BELGIAN POSSESSIONS

**The Belgian Congo.**—It was officially taken over by Belgium in 1907. The central part of Belgian Congo is occupied by equatorial forest and the chief products include palm nuts, palm oil, rice, cocoa and rubber. The higher ground bordering Northern Rhodesia and Angola has probably the largest reserves of copper in the world, and is a thriving mining district in the very heart of Africa.

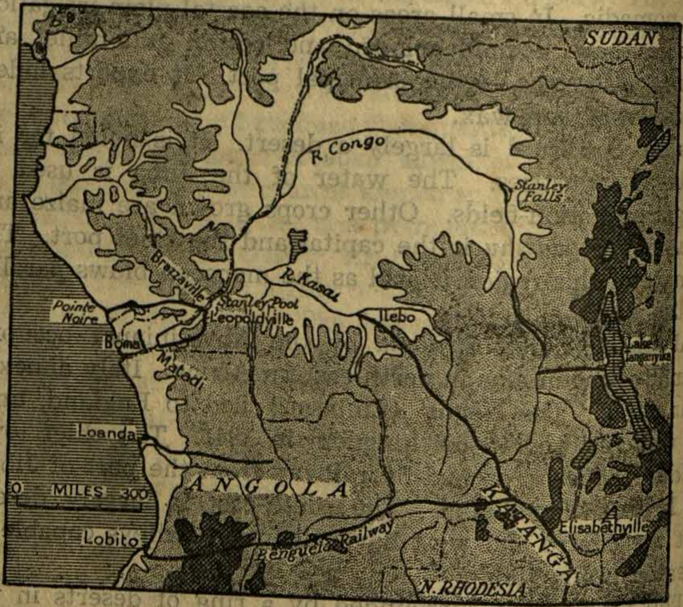

FIG. 169.—Map of the Congo Basin.

There is a direct access by the railway from Lobito Bay in Angola, and also from South Africa through Southern and Northern Rhodesia. The output of diamonds is considerable; gold, radium and tin are also mined in large quantities. There is no trouble from the tse-tse fly in this part of the country and so cattle thrive on the highlands. Cotton, coffee and tropical foodstuffs are grown. Direct communication is established by Belgian steamship lines to the coast and by airlines right across the Sahara desert.

*Kambove* is the centre of copper mining. *Elizabethville* is the capital of Katanga province. *Boma* is the chief port, lower down the river. *Leopoldville* is the administrative centre and has a river port. The exports are gold, copper, cotton, tin, palm oil, palm nuts and coffee.

## SPANISH POSSESIONS

**The Possessions of Spain.**—Rio de Ore, Spanish Guinea, Fernando Po and Spanish Morocco. Rio de Ore is mainly a part of the Sahara Desert. It lies on the route of the Trans-Atlantic air services to South America. The island of Fernando Po produces cocoa. The Canary Islands have a genial climate. The chief article of produce is bananas.

## PORTUGUESE POSSESSIONS

**The Possessions of Portugal**—Cape Verde Islands, Azores, Madeiras, Guinea, Principe and St. Thomas Islands, Angola and Mozambique. The islands of St. Thomas and Principe are famed for their cocoa and other equatorial products like coffee, rubber, cocoanuts and cinchona. The territory of Angola is to a large extent a fertile grazing country. It is likely to be opened up with the construction of the Lobito Bay railway, by British interests, right across the colony to the Belgian territory of Katanga. The exports are: rubber, wax, cocoanut, sugar, maize, coffee, cocoa and diamonds. Portuguese East Africa has the important ports of Beira and Lourenco Marquess, which serve as outlets for Rhodesia and part of Transvaal respectively. The products of Portuguese East Africa are sugar, maize, cotton, gold, silver and timber.

**Physical Features.**—In its physical features, Africa is like Australia in build, as it is a compact continent of the plateau type with bordering ranges on the east, west, and south. Except in the north-west the whole of Africa is occupied by

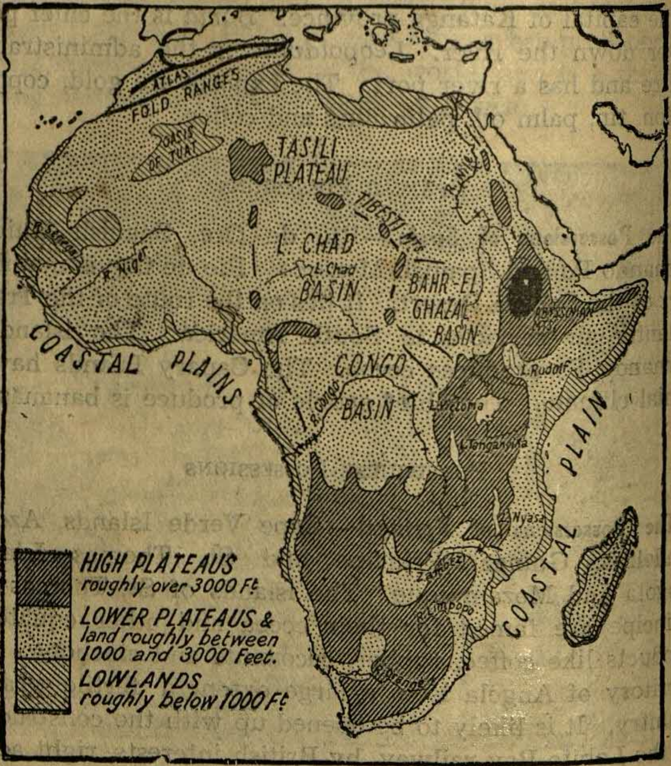

FIG. 170.—The physical map of Africa.

a great plateau, which is usually surrounded by a narrow coastal plain. Sometimes, as in South Africa, there are several "steps" up on to the plateau. The plateau is higher in the south than it is in the north. The High Plateau of South Africa stretches nearly as far north as the equator, and then sends broad branches northwards over the lower plateau there. Running along the eastern side of the surface of the plateau there are one or more lines of mountains. These mountains are *not* fold mountains; they are of volcanic origin, being built up by lavas which poured out on the surface of the plateau. The highest mountains in the continent are in Abyssinia, near the Southern end of the Red Sea. A little further south, just on the equator, lie the Great Lakes. The highest peaks here are volcanic, though none is at present active. Kilimanjaro is over 19,000 feet high, while Ruwenzori and Mount Kenya are not much lower. Although on the equator, they are always snowclad. The Atlas Mountains are in the north-west; while at the south-east edge of the plateau lies the Drakensberg (which is something like the Western Ghats of India).

**Rivers.**— The rivers of Africa have special features which make them different from the rivers of the other continents. Most of them rise on the surface of the plateau, and have a long navigable course over the plateau until they reach its edge. There they drop down to the coastal plain by a series of rapids or falls. Very few of the rivers are navigable far inland from the coast, but there upper course can be used. Some of the rivers, notably the Nile, descend from the plateaus by a series of steps. The most important rivers of Africa are the Nile, which flows northwards into the Mediterranean Sea; the Senegal, Niger, Congo, and Orange draining into the Atlantic Ocean; and the Limpopo and Zambezi flowing into the Indian Ocean. The big basin of the river Congo, forming a depression in the African Plateau, should be noted.

An important feature of the plateau is the series of great lakes amongst the volcanic mountains of the east. The lakes occupy two main lines, probably rift valleys, with Lakes Albert, Edward, and Tanganyika along the western line, and Lakes Rudolf and Nyasa along the eastern line.

Lake Victoria lies between the two lines. To the south of the Sahara lies Lake Chad, the centre of a region of inland drainage.

(*a*) The *Nile.*—This is the most important of all, and is also the longest. Its whole course is about 3,600 miles. It rises in the great lake, the Victoria Nyanza, and flows northward. At first it has several tributaries, the two most important being the Blue Nile and the Atbara. They flow in on the right bank from the Abyssinian hills. In the lower part of its course it flows through the desert, and here, like the Indus, it has no tributaries at all. Like the Indus too, it forms a large delta where it enters the sea. Navigation is possible except where there are cataracts which interfere with the passage of boats. At several places, too, dams such as have been made on our Indian rivers, have been made to control the flow of the water and let out as much as is needed, and no more, to the fields on either side of the river.

(*b*) Next comes the *Congo.* It rises very near the source of the Nile, but flows westward to the Atlantic. It is not quite 3,000 miles long, but drains a very large basin in the heart of Africa. It receives large tributaries on both banks throughout its course, and brings down to the sea more water than any other river in Africa. Notice how the sources of some of its tributaries and those of the Nile seem almost to mix one with the other without any clear watershed between. Though a thousand miles of its middle course are navigable, it is useless as a means of communication from the sea, as, where it drops from the edge of the plateau, there are miles of rapids which no boat can pass.

(*c*) The *Niger* rises north of the Congo but flows first inland and then sweeps round in a great curve to the coast further east. This river is more useful for navigation than most of the other rivers, boats being able to go 400 miles from the mouth before the cataracts begin.

(*d*) South of the Congo the *Zambezi* flows to the east into the Indian Ocean. The same difficulty about navigation is found here, cataracts continually obstructing the stream. This river is specially noted for the Victoria Falls, where the water of the whole river drops suddenly over a great cliff 400 feet high, and then flows on through a very narrow gorge for some miles.

(*e*) There are two more rivers in the south, the *Limpopo*, flowing east, and the *Orange* River, rising in the Drakensberg Mountains and flowing westward across the continent. Both get very low in the dry season, and then navigation is impossible.

## CLIMATE

Africa lies both to the north and to the south of the equator, so when the Hot Season is prevailing in North Africa, it is the Cold Season in the south. When it is the Hot Season in the south, it is the Cold Season in the north.

**The Climates of Africa.**—The climates of Africa are arranged so that we find the same types to the north of the equator as there are to the south.

(*a*) Equatorial Climate, always hot and wet, is found along the equator, especially in the Basin of the Congo and along part of the coast of the Gulf of Guinea.

(*b*) Tropical Climate, rainy in the summer and dry in the cool season, is found both north and south of the equator. But in the north the "summer" is from May to October, whilst in the south it is from November to April. So characteristic of Africa is this climate that it is often called the "Sudan type".

(*c*) Desert Climate, dry at all seasons, is found along the High Pressure Belts in the north and in the south. In the north it stretches right across the continent, but in the south it is found only on the west of the continent. The east receives moisture from the Trade Winds blowing across the Indian Ocean. [Warm temperate climate (*d*).]

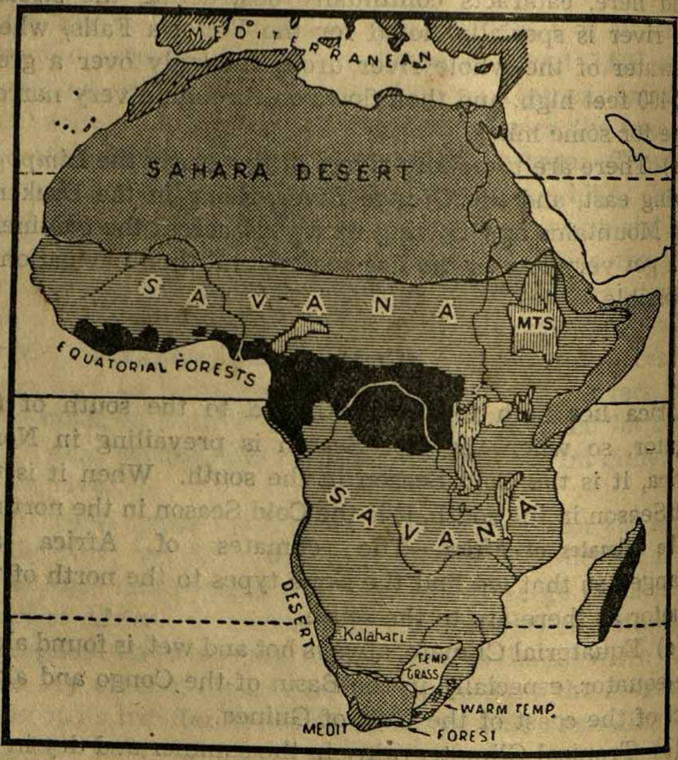

FIG. 171.—The natural vegetation of Africa.

(*e*) Mediterranean Climate, with winter rain and summer drought, is found both along the north and the south-west coasts. Again, "summer" in the north is from May to October, in the south from November to April.

(*f*) Temperate grassland climate occurs on the plateau in South Africa.

The whole of Africa is a plateau, and the plateau is especially high in the south. So we find the climates are often much cooler than they would be if the surface of Africa were lower.

### THE VEGETATION BELTS

These correspond very closely to the climate belts.

(a) Equatorial Forests of tall evergreen trees cover the Basin of the Congo and the Guinea Coast, where the rainfall is very heavy.

(b) Tropical Grassland and Savanas occupy a broad belt on either side of the Equatorial Forests. The most characteristic type of vegetation in Africa is the savana—known in the south as the bush veld. As we approach the desert region the savana becomes poorer and poorer and passes into scrubland. The Kalahari "desert" is really scrubland.

(c) Deserts cover enormous areas in North Africa (Sahara Desert) and a smaller area in South Africa (south-west coast). Sometimes they are great sandy wastes, at other times bare, rocky mountain ridges break up the surface. There are many important oases in the Sahara; most important of all is the long narrow valley of the Lower Nile.

(d) Warm Temperate Forests occur in Natal in the south-east.

(e) Mediterranean Vegetation is found near and along the coasts of north Africa and south-western Africa.

(f) Temperate Grassland covers the south-eastern part of the African Plateau. The grassland is known as the veld. It is cool in winter and hot in summer, but it is not a great distance from the sea like the grasslands of Europe and Asia, and so does not suffer from the same extremes of temperature. (In South Africa nearly all the natural vegetation is called "veld" just as in India we call it "jungle". The temperate grassland is really the "High Veld" because it is found on the heights of the plateau.)

(g) Mountain Vegetation, with temperate forests and grasslands, covers most of the Abyssinian Highlands.

### REGIONS AND THEIR PRODUCTS

The major natural regions correspond to the vegetation belts and we may now study the natural products of these regions.

*(a)* **Equatorial Forests.**—Some of the trees, such as mahogany (a bright red brown wood) and ebony (black) are valuable as ornamental timber for making furniture. Rubber is grown, especially in the Congo basin. The oil palm and the cacao tree (from which last, cocoa and chocolate are obtained) are the chief products of the Guinea Coast. Sugarcane is an important crop on the east coast, and the best cloves in the world come from the islands of Zanzibar and Pemba. Herds of elephants wander about the western forests, and the ivory obtained from them is a valuable export. Huge man-monkeys called gorillas are also found, and there are crocodiles in the rivers.

*(b)* **Grasslands.**— To the north, east and south of the Western Equatorial forest stretch grasslands where the rainfall is less and therefore the vegetation is not so thick. In the rainier and more fertile parts stretches of good grass are dotted over with fine large trees. As the rainfall gets less towards the north and south the trees get smaller and more thorny and the grass poorer. In the north a great deal of valuable gum is obtained from one of these thorny trees, a kind of acacia. Cotton is an increasingly important crop, especially in the north. The people grow mainly maize (which they call mealies) for their food. On the high ground in the east, on the slopes of the plateau, a great deal of coffee is cultivated. On the highest land (in Kenya Colony), English grain, fruits and vegetables can be grown, though it is almost on the Equator. On the grasslands great numbers of cattle are reared, also sheep in the south. These grasslands are the home of wild animals of all kinds. Great herds of antelope feed on the grass. Here too is the home

of the giraffe with his long neck, and then there are lions which come to hunt and prey on the others. These lions are in some parts so numerous and so fierce that some years ago they actually stopped the making of the railway from Mombasa for a short time, because all the coolies working on the line were afraid of them. The stripped zebra is another animal of the African grasslands. The clumsy rhinoceros and hippopotamus are also found, the latter close to rivers, where it loves to wallow in mud and water like the buffalo. Crocodiles abound as far south as the Limpopo, a name which means "Crocodile River". The southern grasslands (temperate grasslands) are known as the "Veld". Here the climate is dry, and cattle and sheep-rearing is an important industry. In the damper parts maize is the great crop. Ostriches, great birds which run instead of flying, used to be reared on farms in the very dry karroo, for the sake of their beautiful wing feathers. By the help of irrigation, crops of cotton and fruit are grown. The coast between the Drakensberg mountains and the sea is so sheltered by the high land as to be tropical in its productions (warm temperate forest region). Sugar and tobacco are grown.

(*c*) **Desert.**— To the north and south the grasslands gradually get poorer and poorer, with thinner grass and fewer trees, till they pass into actual desert. Here great stretches of land are absolutely without vegetation. Here and there an oasis is found, where there is a spring of water with some grass and few trees. In the Sahara these oases are sometimes of considerable size, large enough to contain whole villages. The chief tree here is the date palm, the fruit of which forms a great part of the food of the few inhabitants and of the traders who cross the desert by well-known caravan routes. Dates are also exported to other countries, and you have probably seen them dried.

(*d*) **Mediterranean Regions.**— At the extreme north-west and south-west of Africa we find strips of land with dry summers and winter rain. That in the north is actually a part of the Mediterranean belt. That in the south, round the Cape of Good Hope, is also called "Mediterranean" because it has the same climate and productions. The usual Mediterranean fruits, such as olives, lemons, oranges and vines—the two latter especially important at the Cape—are found, and in the north there is a great deal of a very large rough kind of grass, Esparto grass, much used for making paper.

(*e*) **The Lower Nile Valley of Egypt.**—This region gets very little water from rain, but mainly by irrigation from the river. This soil is very fertile, being continually renewed by the mud brought down by the Blue Nile and the Atbara from the Abyssinian Hills, and produces a great many crops. Irrigation works control the supply of the river water, letting it out just as required to the lower part of the valley, to water the fields there. One of the most important dams is at Aswan and another at Sennar, not far from Khartoum, where great walls of solid masonry are built right across the river. Still bigger irrigation works are planned higher up the stream. The valley being straight and narrow there is no need for an elaborate system of canals as in the Punjab. Cotton is now the most important crop. Rice and sugar are also grown in some parts in the summer, while maize and wheat are winter crops. In Egypt there is so little rain that no crops would be possible without the water of the Nile, so Egypt is often called the "Gift of the Nile".

**Communications.**—Travelling in Africa is a difficult business. The large rivers like the Nile and the Congo can be used by steamers for parts of their courses only, as vanigation is interrupted by rapids. Across the veld in South Africa, oxen are used to draw wagons. In Central Africa, owing to the presence of a small fly called the tse-tse, cattle cannot be used, and so people carry heavy loads on their heads. Roads and railways are not developed as much as water communications. In North-West Africa and South Africa a network of railway lines has been built, but in East, Central and West Africa, railways are very few. One great railway has been planned to cross Africa from north to south, the Cape-to-Cairo railway. The southern part of this railway reaches as far as Northern Rhodesia, and the northern portion to the Sudan, but between Northern Rhodesia and the Sudan there are still several gaps with neither railway nor river routes. The problem of communication in Africa may be satisfactorily solved by the aeroplane and the establishment of regular air services. The communications of Africa with other continents are mainly by sea, and ships sail to and from the most important countries of the world.

Communications round the coast are also carried on in this way, but there are very few good harbours especially on the west coast.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches etc.

1. Describe how the geographical position of the following towns has made them important:—Durban, Cairo, Cape Town, Port Said, Mombasa, Dar-es-Salaam, Lourenco Marques, Johannesburg, Pretoria, Kimberley.

2. What are the chief articles exported from each of the following ports?:—Alexandria, Zanzibar, Cape Town, Port Elizabeth, Freetown.

3. Explain:—

(1) Why the rivers of Africa are not very useful for navigation. (B. U. 1933)

(2) Why we cannot speak of any one time of the year as being summer or winter for the whole of Africa.

(3) Why the productions of the Nile Valley differ from the country immediately around it.

(4) Why large numbers of Indians have emigrated to Africa.

(5) Why it is called the Dark Continent.

(6) Why the Nile Valley was the seat of early civilization. (B. U. 1931)

4. Describe the natural regions into which Africa can be divided; and describe the climatic conditions and the natural vegetation of these regions. (B. U. 1922)

5. Describe the proposed route and the difficulties in the constructio of the Cape-to-Cairo Railway. What advantages are expected to follo from this line?

(B. U. 1922

Describe the route with special reference to the physical features o the lands through which it passes.

(B'. U. 1931

6. Write short notes on:—
   (1) Irrigation in Egypt.
   (2) Cotton-growing regions of Africa.

7. Give a short geographical account of Egypt, or Kenya, o Abyssinia.

8. Draw an outline map of Africa and locate the following:—
   (1) Three important rivers;
   (2) Deserts and grassland regions;
   (3) Areas where gold and diamonds are mined;
   (4) Three important sea-ports.

(B. U. 1934)

9. State how geographical conditions have affected the life of the Pygmies or that of the Boers.

## CHAPTER XXIV

## SOUTH AND CENTRAL AMERICA

South America is a continent of republics, some of which (such as Argentina) are rich and prosperous. The original population consisted of American Indians, of whom the Incas were highly civilized, and possessed a rich Empire over the Andes in Peru and Bolivia. In the fifteenth century, the Empire fell into the hands of the Spaniards, who gradually have since claimed almost the whole of the continent. The official language of the continent is Spanish, except in Brazil. Brazil came under the Portuguese.

In the past Negroes were brought in to work on the plantations. Immigrants from European countries, especially Italians, Germans and Russians have settled in Brazil and Argentina. In the struggle that followed with the immigrants, the old civilization was destroyed. Most of the Indians now remaining are backward, uncivilised people left in the forest and the desert, where the white man could not follow them. They are a dark-skinned, straight-haired race, and seem on the whole more docile than the fierce Red

Indians of North America. The civilised nations now inhabiting South America are mainly descended from the Portuguese and the Spanish settlers, and Spanish is the usual language over most of the continent except Brazil, where Portuguese is spoken. Negroes were introduced for labour in the plaintations, while recently large numbers of European immigrants, especially Italians, have settled in the temperate lands of the south. For long, Brazil, the largest country of South America, was a Portuguese colony. We no longer speak of Spaniards and Portuguese or Italians in South America, but we now talk about the Argentinians and the Brazilians, etc, according to the country where they now live. Other races are also found. Many Indians from India have settled on the north coast lands and there they carry on agricultural work. There are Chinese too, and in the temperate parts Englishmen are found either as coffee planters or cattle-rearers.

## PEOPLES AND POPULATION

South America has a smaller average population to the square mile than any continent except Australia. Large parts of the Andes Mountains have less than 2 people to the mile. The Amazon Basin is very thinly populated when compared with the Congo Basin in Africa. This is because the ground is lower, and is sometimes swampy and subject to floods. Owing to the valuable mineral products, silver and copper from the hills, and nitrates from the coast, the desert is not among the least populated parts. On the whole the grasslands and the Mediterranean region are the most populated. All the thickest centres of population are found near the coast.

Notice from the population map that the greater part of the continent is poorly populated. There are three areas of heavy population—(*a*) around Valparaiso, which enjoys a productive Mediterranean climate; (*b*) that part of the progressive state of Argentina around Buenos Aires where the climate is ideal for wheat and cattle; (c) that part of the coastal lands of the Eastern Highlands where soil and climate favour the growth of coffee. Notice what a splendid example we have of the climatic control of the distribution of population.

**Minerals.**—Originally the desire for gold and silver

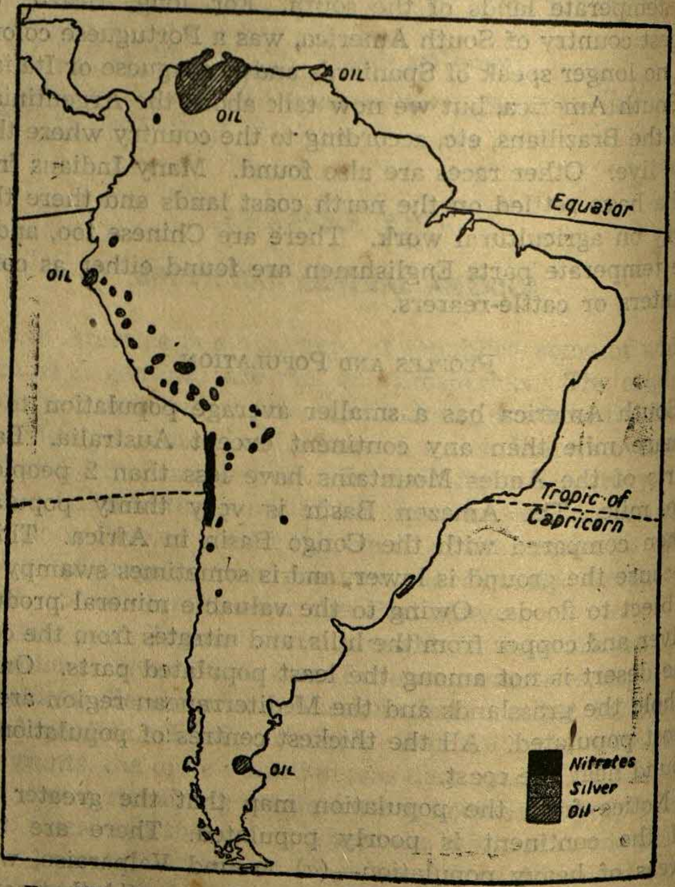

FIG. 172.—Chief mineral-producing areas of South America.

brought the Spaniards and the Portuguese to South America any many a war with the natives and other Europeans was fought on that account. Silver and copper are still mined in Peru and Bolivia, and tin ore is obtained from Bolivia. The desert region of North Chile is famous for nitrate. This is a kind of salt which collects on the ground. It is useful for growing crops and is exported to the U.S.A. and Europe. In recent years oil in large quantities has been found in Venezuela, Columbia, Peru, Ecuador, and Argentina, as well as in the small British Island of Trinidad. See Fig. 172.

## PHYSICAL FEATURES

Notice that South America has few indentations in its coast. With the exception of Africa, it has the least length of coast line for its size of all the continents. Study Fig. 173 and see how South America falls into four well-defined physical regions.

These are:—(1) The narrow coastal plain bordering the Pacific Ocean.

(2) The great fold range of the Andes—broad in the north and consisting of several ranges in between, but narrowing to one main range in the south.

(3) The eastern highlands—formed of two plateaux of old hard crystalline rocks, separated by the Amazon River. The two plateaux are the Guiana Highlands in the north, and the Highlands of Eastern Brazil in the south.

(4) The Great Central Plains.—These fall into four divisions from north to south:

(*a*) The basin of the Orinoco (the Llanos, or grassy plains).

(*b*) The great basin of the Amazon (the Selvas, or Equatorial Forests).

(*c*) The basin of the Parana-Paraguay Rivers.

(*d*) The Argentine Pampas and the Patagonian Desert.

The coast is largely unbroken except at the great rive mouths of the Orinoco, Amazon, and La Plata. The Sout and West coast is an exception. Here, as is New Zealan

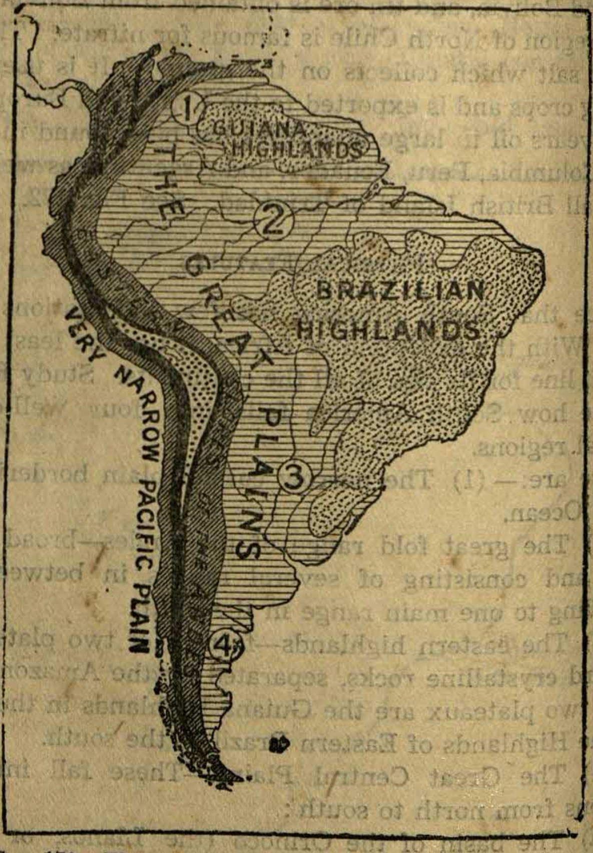

FIG. 173.—The main physical features of South America.

1=The basin of the Orinoco; 2=The basin of the Amazon; 3=The basi of the Parana and Paraguay Rivers; 4=The Argentine Pampas an Patagonian Desert.

in the same latitude, the coast is very indented. There are drowned valleys and inlets, and small islands off the coast.

The Andes mountains, in parts, are very high, and in fact, next to the Himalayas the highest in the world. They have many volcanic peaks, Chimborazo, Cotopaxi, Aconcagua. The Eastern Highlands are much lower than the Andes, no peaks there being over 9,000 feet.

**Rivers.**—There are five important river systems in South America, one corresponding to each of the divisions of the Central Plains and a fifth system—that of the Cauca and Magdalena—draining the northern ranges of the Andes.

The great Amazon may be compared to the Mississippi or the Congo. Like these it drains an enormous country through the many tributaries that flow into it. It runs from West to East and through a belt of thick equatorial forest. Another important river, a little to the north, is the Orinoco running more or less parallel to the Amazon. The Parana and the Paraguay drain the southern part of the plain, and unite not far from the sea to form the Rio de la Plata or Plate River.

**Climate.**—The climate of South America is controlled to a great extent by its physical features, and especially by the great chain of the Andes. In the northern two-thirds of the continent the rain-bearing winds are the Trade Winds blowing from the north-east and south-east. The Andes drain these winds of their moisture, so that on the Pacific coast we find the curious feature of an almost rainless desert bordering the ocean. The southern third of the continent is under the influence of the North-Westerly winds of the cyclonic belt, which bring abundant rainfall to the southern part of the Pacific coastal strip. The mountains again extract most of the moisture from the winds, so that here in the south we find desert again, but this time on the Atlantic side of the Andes—the Patagonian Desert. Now, the Mediterranean type of climate is found just where the belts of the Trade Winds and Anti-Trades meet and this strip of the western coast has a Mediterranean climate—hot dry summers and warm moist winters. The town of Valparaiso is in this belt. Remember that the seasons are the opposite of those in the northern hemisphere and that December is midsummer.

Fig. 173 shows you how the regular winds are dried in crossing the mountain ranges. Their influence on rainfall is well seen in Fig. 174. The saying "rain follows the sun" is true of South America. When the sun is in the south there is a heavy rainfall over the greater part of the continent. The following points should be noticed on the map:

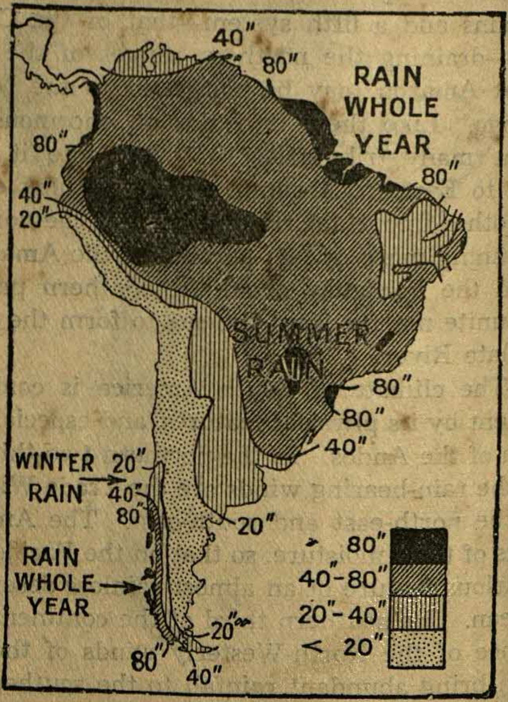

Fig. 174.—Rainfall map of South America for the whole year.

(1) The heavy rainfall over the Amazon River (Equatorial belt of rain at all seasons).

(2) The dry Pacific coastal strip.

(3) Patagonia is dry, being on the lee of the Andes.

When the sun is to the north, over the Tropic of Cancer, the heaviest rainfall is in the north. The Amazon River is still in the heavy rain belt, and the Pacific coastal strip is still dry, but Valparaiso is now within the influence of the westerly winds and is receiving some rain (Mediterranean region). Patagonia is again dry, being still on the lee of the Andes.

You remember that in India there is a tendency for the rain-bearing winds to be drawn up the Ganges Valley. Similarly in South America the rain-bearing winds tend to be drawn up the Parana-Paraguay valleys and right up the Amazon Basin. In Eastern Brazil the rain-bearing Trade Winds are dried in crossing the edge of the plateau, and so the San Francisco Valley is dry. Compare the dry Belt of Burma. The coast enjoys a moderate rainfall, but the winds do not penetrate to the interior of the plateau, with the result that the surface of the latter is somewhat dry. In the north-west of the continent the rainfall is increased by a slight monsoon.

## NATURAL REGIONS

Combining what we have learnt of the physical features, and the climates, we can divide South America into its major Natural Regions. We can take each of the main physical regions, and we shall see that we can divide each up according to climate. Fig. 175 gives a key to these regions.

(1) **Natural Regions of the Pacific Coastal Strip.**—

(*a*) Wet Region in the north, as far south as the equator.

(*b*) Desert Region of North Chile. Great areas of this dry region, however, yield large quantities of a salt known as nitrate, which is valued in the agricultural countries of Europe as a manure. This salt occurs as a crust over the surface of the desert. Were there any rainfall it would all dissolve and be washed away. Most of the towns in this region are either nitrate ports, or serve as outlets to mountainous regions behind.

(*c*) The Mediterranean Region, a narrow strip around Valparaiso enjoying a Mediterranean climate and having the usual Mediterranean products.

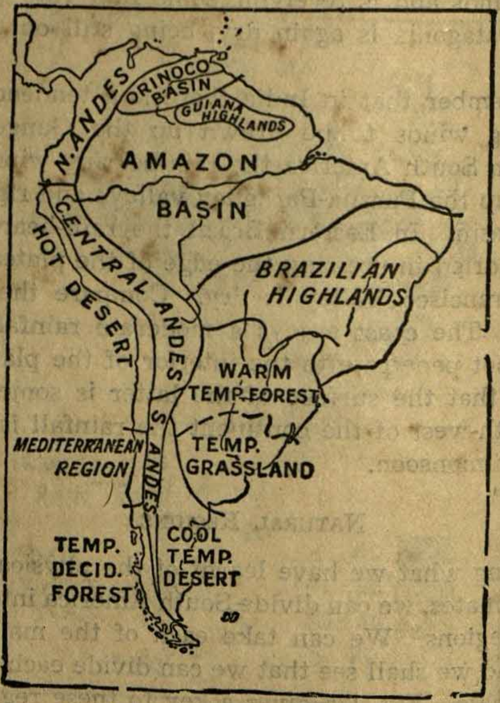

FIG. 175.—The Major Natural Regions of South America.

(*d*) The Cool Temperate Strip, enjoying a moderate rainfall and covered with forests.

(2) **The Andes Chain.**—(*a*) The Northern Andes, consisting of parallel chains separated by the fertile valleys of the Cauca and Magdalena.

(*b*) The Central Andes, chiefly noted for mining.

(*c*) The narrow Southern Andes, acting as a divide between east and west.

(3) **The Central Plains.**—(*a*) The Basin of the Orinoco and lowlands, fringing the coast and enjoying a tropical climate, and, where developed, producing such characteristic tropical products as sugar and cocoa. The natural vegetation is mainly coarse grass and the grassland country is known as Llanos.

(*b*) The Amazon Basin. Most of this immense basin falls within the belt of equatorial rain at all seasons, and is clothed with dense Equatorial Forests (Selvas) of huge hardwood trees. Like other regions of dense tropical forest, it is sparsely populated by backward tribes. It yielded the most important of the rubber-bearing trees, but most of the best trees growing wild have been found and killed by careless tapping. (The great rubber-producing regions of the world are now the artificial plantations of Malaya and Ceylon.)

(*c*) The Basin of the Parana-Paraguay. Part of this region is forested, but in the lower part it is a land of rich luscious grass on which cattle thrive. To the south, in the Argentine, the grassland is drier and now forms one of the great wheatlands of the world.

(*d*) The Patagonian Desert. In the northern part this region supports a few sheep, but the greater part is a dry waste of shingle and sand.

(4) **The Eastern Highlands.**—(*a*) The Highlands of Guiana and Venezuela. This region has great mineral resources, but is little developed owing largely to an unhealthy climate.

(*b*) The Brazilian Highlands. This region of old crystalline rocks has vast mineral resources. The coastal portion has a rich soil and a tropical climate, ideal for coffee and other tropical products.

## THE COUNTRIES OF SOUTH AMERICA

The continent is divided up into a number of States. All except the three little Guianas in the north are independent republics ruled by their own presidents and parliaments. Notice the relationship between the countries and the climatic regions and remember that the most important countries are the A.B.C. countries—Argentina, Brazil and Chile.

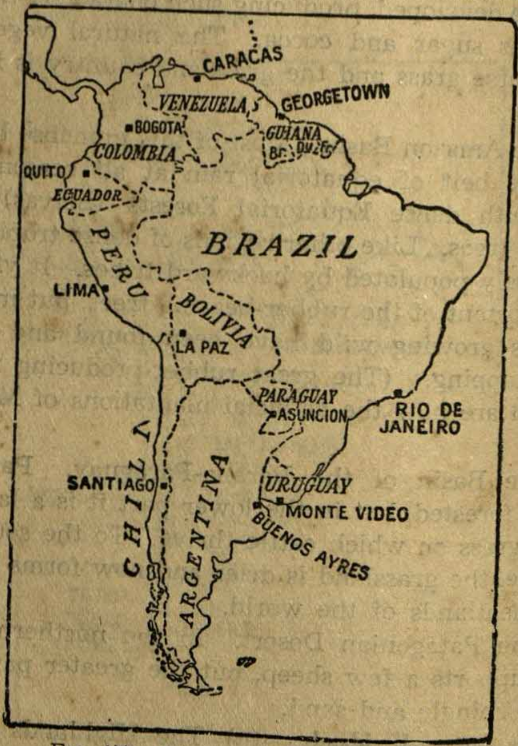

FIG. 177.—South America (Political).

**The Argentine Republic** occupies the greater part of the temperate grassland, with *Buenos Aires* as its capital. Cattle and sheep rearing and wheat growing are its chief occupations. Frozen meat, wheat, wool, and hides are exported.

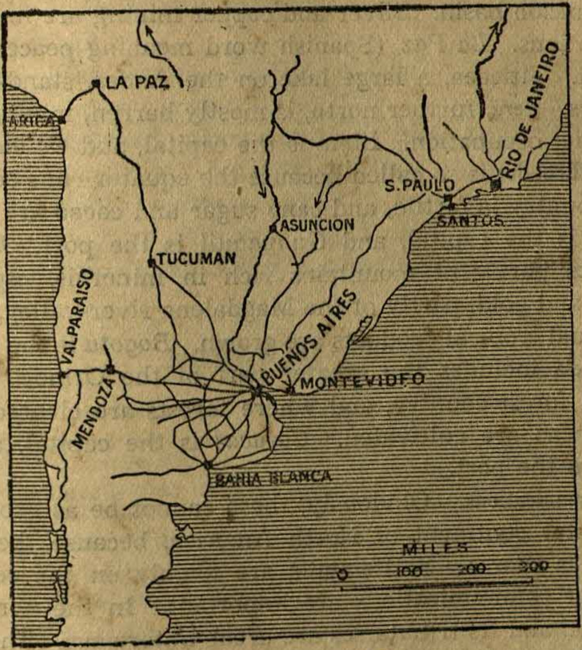

FIG. 178—Argentine railways.

**Brazil** is the largest State. It includes the greater part of the Amazon Basin. It has an important trade in coffee. *Rio de Janeiro* is the capital. The narrow west coast region belongs to **Chile.** The southern part is the cool forest region. The central part is the fruit-growing Mediterranean belt, where *Santiago,* the capital, is situated. Further north is the nitrate-producing region.

**Other Republics.—Uruguay,** to the south of Brazil, is a cattle-rearing State. *Montevideo* is both a big port and the capital. **Paraguay,** round the river of the same name, is an inland State. *Asuncion* is the capital. **Bolivia** consists of a great plateau in that part of the Andes where they are broadest, sloping away in the east towards the valleys of the Amazon basin. Silver and copper mining are important occupations. *La Paz* (Spanish word meaning peace) is the capital. Titicaca, a large lake on the Andes, stands on its borders. **Peru,** further north, is mostly barren, mining being the chief occupation. *Lima* is the capital, and *Callao* is the port. **Ecuador** is so called because the equator runs across it. The country is fertile, and cane sugar and cacao are grown. *Quito* is the capital, and *Guayaquil* is the port. **Colombia** consists partly of mountains rich in minerals, especially silver and gold, partly of the Magdalena river-valley, where the usual tropical products are grown. *Bogota* is the capital. **Venezuela** includes the greater part of the Orinoco valley. It is a forest country, and where forests are cleared sugar and cacao are cultivated. *Caracas* is the capital, and *La Guayra* the port.

**Communications.**—Obviously, these cannot be as good as in the sister continent of North America, because the population is sparse. Settlements are mainly on the coast, so steamer communications are important. In the north, the Amazon and its tributaries are great waterways. The Plate river is also navigable. In the south, there are railways round Buenos Aires and Montevideo, connecting the grasslands with these two ports. The highest railway in the world goes over the Andes and across the continent to Valparaiso. It has to go through a very long tunnel which was constructed with great difficulty. Another hill railway climbs up to La Paz. In the more open grasslands, motor roads are being developed, and it is hoped that before long, aeroplanes will overcome the difficulties of communications in this continent.

**Colonies.**—Then come three narrow strips of land—British, Dutch and French Guiana, and belonging to the countries whose names they bear. *Georgetown*, the capital of British

*Guiana* is a port—trading in sugar, cacao and spices. Trinidad, an island near the mouth of the Orinoco River, is a British possession. It has oilfields and the principal product is cocoa.

**Trade.**—Like Africa, South America is a storehouse of foodstuffs and raw materials for North America and Europe. Coffee from Brazil, wheat, meat and hides from Argentina, nitrates from Chile, and copper, silver and gold found all along the Andes are the exports.

Machinery, iron and steel goods and woven goods are imported from North America and Europe in return.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate the answers by diagrams, sketches, etc.

1. On a map of South America mark two places (*a*) with rain all the year, (*b*) with summer rain, (*c*) with winter rain, (*d*) with no rain.

2. Name three or four important exports of South America, and say to which ports you would send for them.

3. Give reasons for the following:—

(*a*) The Amazon basin is thinly populated. (B. U. 1927).

(*b*) South America is more backward than North America.

(*c*) Which is more useful as a means of communication, the Amazon or the Congo?

4. Write short notes on—

(1) The Mineral wealth of South America and its distribution.

(2) The Andrean Chain.

(3) South America is the Continent of Plains.

(4) The position and importance of Rio de Janeiro.

5. Describe the chief occupations of the inhabitants of the Amazon Basin. Show how they depend on climate and physical features. (B. U. 1929).

What are the possibilities of development in this region?

6. What geographical causes have led to the importance of Argentina? Give its geographical description and trace the growth of trade between that county and Britain? How does Argentina compare with Brazil in importance?

7. Divide South America into its natural regions and describe their characteristics. (B. U. 1933)

8. If you had to go and live in South America, in what country would you settle, and why?

9. In what parts of South America do we find settlers from (*a*) Northern Europe, (*b*) Southern and Eastern Europe, (*c*) India? What crops do they grow?

## CHAPTER XXV

## NORTH AMERICA

**Discovery, Position and Size.**—The Continents of North and South America form the New World; it is possible that hundreds of years ago the brave Norse fishermen may have sighted the coasts of North America, but the real discovery of the New World for European people was made by Columbus in 1492. Columbus, knowing that the earth was round, sailed westwards and came across the land mass of America. He thought he had reached India, and called it the

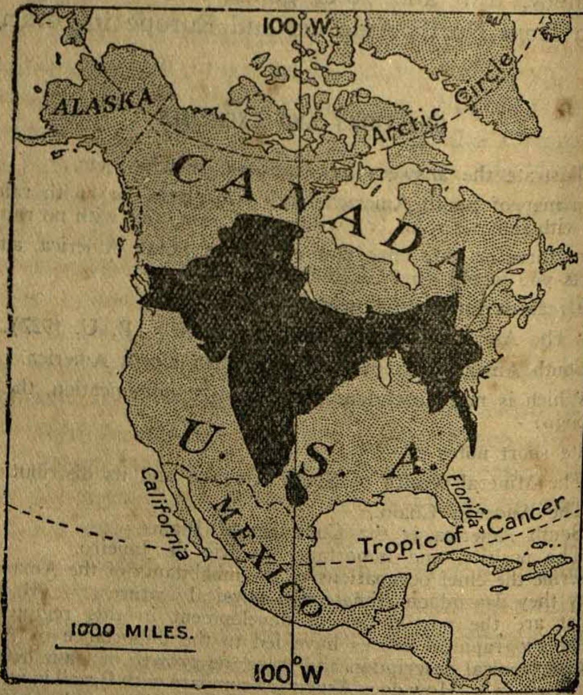

FIG. 178.—The position and size of North America.

West Indies. After Columbus, other travellers followed and North America was gradually surveyed and opened up.

## PEOPLES

**Red Indians.**—When Europeans, following Christopher Columbus, first crossed the Atlantic they found in the continent of North America great forests that then covered the eastern parts. The native inhabitants were a few tribes of wild red-skinned people, who got their living by hunting and fishing. From Columbus' mistake about the country, these people were called Indians, and later came to be distinguished as Red Indians. At first these wild people were a danger to new settlers. Gradually, however, they were driven back from the white settlements. Later on they turned cultivators and there came a time when they made friends with the newcomers. But like the aborigines of Australia they could not flourish side by side with the Europeans, and are slowly dying out. They are now found in "reserves", tracks of country mostly in the pine forests that have been set aside for them.

**Eskimos.**—In the far north, on the Tundra, live a few scattered people, called Eskimos. They dress in thick furs, eat fish and whale-fat, make their houses half underground in the snow, and keep reindeer. It is far too cold for any cultivation, and their occupation is catching fish, and hunting and trapping animals for the sake of their fur.

**Europeans.**—The main population, however, is descended from Europeans who came over and established settlements some 300 years ago. The early settlers of 1620 were yeomen of independent Puritan outlook, searching for freedom in both work and religion in a new land. In the beginning they came to the west coast and gradually spread over the whole-country. It is during the last hundred years that they have settled the whole land up to practically the West Coast. In the part that is now known as U. S. A.

people come from many countries, a good many from Britai some from Holland, and some even from Sweden. The Ne York of today arose out of New Amsterdam, the earlie stronghold of Dutch settlers in America. Meanwhile t French, not so much settlers as soldiers, explorers an missionaries, had claimed practically the whole of the i terior of the United States, but Napoleon, when badly i need of funds, handed it over to the young Republic. Thu by the "Louisiana Purchase," this territory became part o the United States. Round the mouth of the St. Lawrenc the French made settlements, and in Canada many peopl speak French even to this day. Along the Atlantic coas the Carolinas take their name from Carolus, or Charles of France and are reminders of early French attempts a colonisation. Then came the changes. The French settlements came under English Government, and the English people also spread over Canada. But the more southern settlements, that had been English, made themselves independent of England in 1775, and there has arisen the greatest republic in the world—the United States of America. The United States has been a nation having very different elements. The Gold Rush of 1849 made California famous and acted as a magnet drawing untold numbers of human beings across the 3000 miles of the continent. Among the immigrants were Germans, Poles, Italians and Scandinavians. Some could give the new country ideas and ideals which have persisted. In a short time they became absorbed into a new nation, though scarcely welded into one whole. Immigration from Europe into Canada and U. S. A. still continues, and whatever the descent of the immigrants, English is the language spoken. Mexico and Central America were settled by Spanish people. Here the native population was large and civilized. For many years they were under the rule of Spain; but now there are independent republics, Mexico being the largest. California, which now belongs to U. S. A., was formerly Spanish; and the very names Los Angeles, Santa Barbara and San Francisco suggest Spanish association. Florida was an early Spanish settlement.

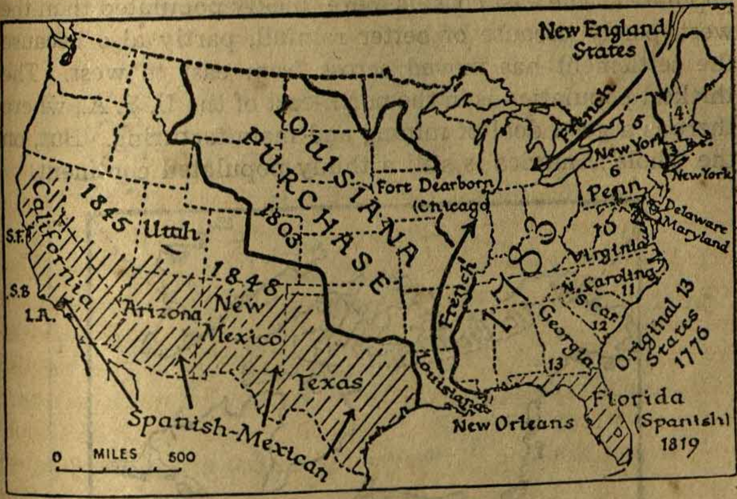

FIG. 179.—The United States, Politico-historical.

**Negroes.**—In the U.S.A., especially in the Southern part and in the West Indies, there are people called Negroes, numbering no less than 12 millions. They are the descendants of the slaves brought over from Africa, to work in the fields in the South where it was too hot for the white men. Slaves were made free nearly a hundred years ago; but they still do the field work now, however, as free labourers with paid wages.

**Pacific Races.**—On the West Coast there are numbers of Chinese and Japanese who have come across the Pacific. The white races are afraid, as they live cheaply, that they will take away their work and profit; but they have made themselves so useful that they cannot be turned out altogether.

**Population.**—The population is very thin in the cold frozen north, and on the steep sides of the Rockey Mountains, as also in the dry desert of the south. The river valleys, fertile parts of the grasslands and the coastal plains are well populated. The east coast is more thickly populated than the west, partly because of better rainfall, partly also because the settlement has moved across from east to west. The thickest population is in the north-east of the U. S. A., where there is a good deal of mining and manufacturing. But, on the whole, America is still a thinly populated continent.

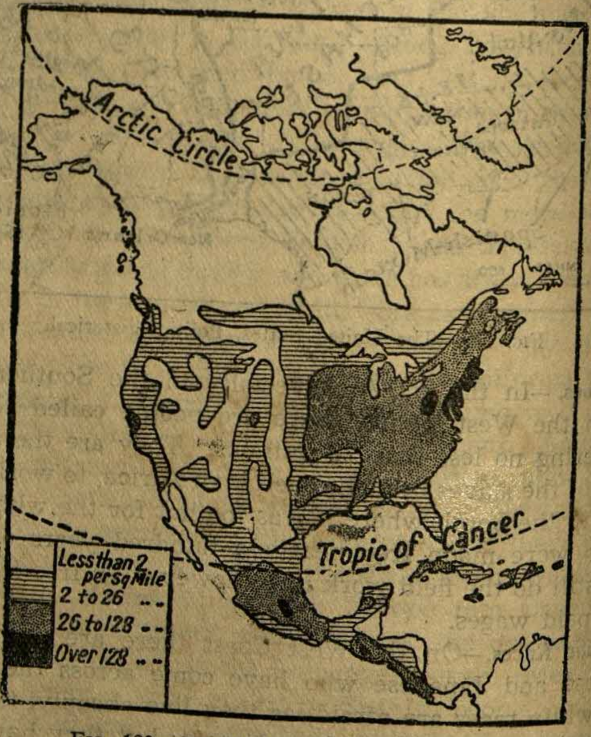

FIG. 180.—Population of North America.

**Political Divisions.**—Stretching across the north of the continent is the Dominion of Canada, one of the self-governing dominions of the British Commonwealth of nations. Separated from Canada in government is the island of Newfoundland. Canada is nearly twice the size of India. The United States of America is nearly the same size. Alaska, in the cold north-west, belongs to the U. S. A., which also dominates Cuba and Porto Rico. The United States of America has also the principal right over the land on either

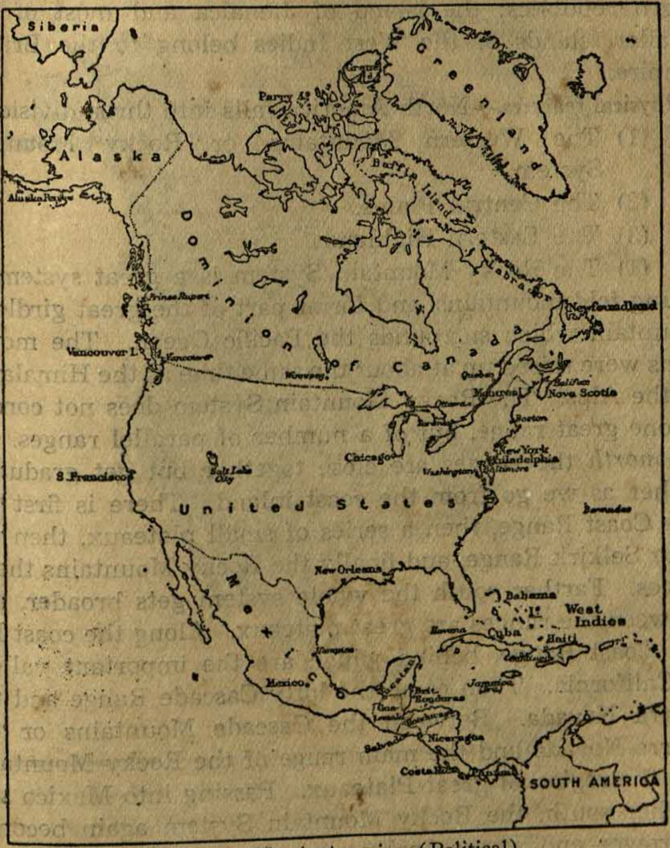

FIG. 181.—North America (Political).

side of the Panama Canal. Mexico is a large republic south of the United States. Central America is divided between six small republics and the Colony of British Honduras. The big island of Haiti is divided between two negro republics; the island of Jamaica and most of the smaller islands of the West Indies belong to the British Empire.

**Physical features.**—North America falls into three divisions:

(1) The Western Mountains, or Rocky Mountain System.
(2) The Central Plains.
(3) The Eastern Highlands.

(1) The Rocky Mountain System is a great system of young fold mountains, and forms part of the great girdle of mountain which surrounds the Pacific Ocean. The mountains were raised up at about the same time as the Himalayas or the Alps. The Rocky Mountain System does not consist of one great range, but of a number of parallel ranges. In the *north* the ranges are close together but get gradually higher as we go from the coast inland. There is first the fine Coast Range, then a series of small plateaux, then the lofty Selkirk Range, and finally the Rocky Mountains themselves. Farther south the whole system gets broader, and between the ranges are great plateaux. Along the coast lies the Coast Range, behind which are the important valleys of California. Then come the lofty Cascade Range and the Sierra Nevada. Between the Cascade Mountains or the Sierra Nevada and the main range of the Rocky Mountains lies the region of great Plateaux. Passing into Mexico still farther south, the Rocky Mountain System again becomes narrower and passes finally as a single chain through the Isthmus of Panama. Follow all these points carefully on Fig. 182.

(2) The Central Plains. The centre of North America is occupied by land which is nearly flat. There are two areas

of lowland, one round the Hudson Bay in the north, and one round the Gulf of Mexico. These two lowland areas are connected along the line of the Mississippi and Red rivers

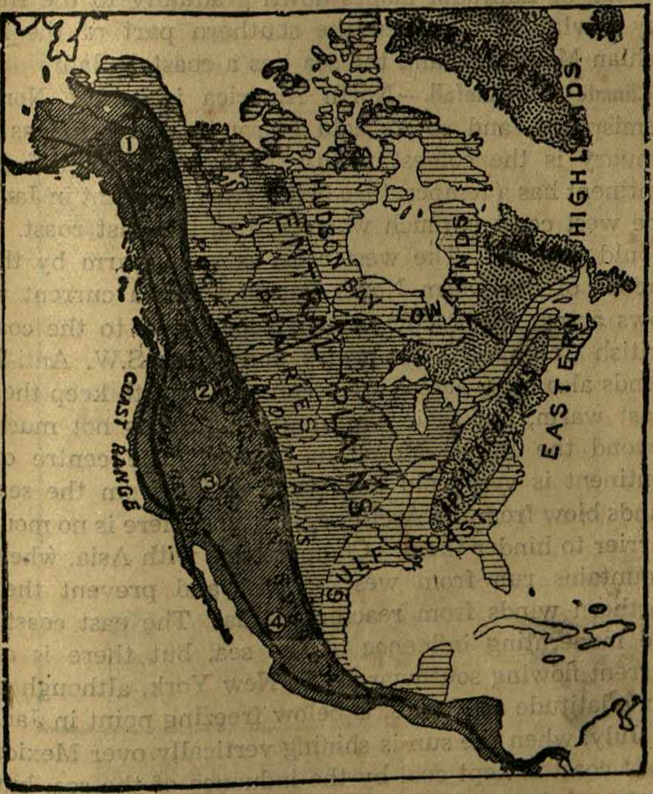

FIG. 182.—The main physical features of North America, showing the three main physical divisions of the continent.

The arrows indicate the direction of slope of the Central Plains (Prairies) the Plateau of Labrador. 1=Plateau of Yukon; 2=Columbia Plateau; 3=Colorado Plateau; 4=Plateau of Mexico.

and the region of the Great Lakes. But westwards the ground rises very gently and gradually.

(3) The Eastern Highlands. There are three great highland areas. The high plateau of Greenland, Plateau of Labrador, and the Appalachian System of Mountains. The Plateau of Labrador slopes down gradually to the Hudson Bay lowlands. Between the southern part of the Appalachian Mountains and the sea lies a coastal plain.

**Climate and Rainfall.**—North America is in the Northern Hemisphere, and so its cold season is the same as ours. January is the coldest month. The northern half of the continent has a temperature below freezing point in January. The west coast is much warmer than the east coast. Why should this be? The west coast is kept warm by the influence of the warm North Pacific Drift, a current which flows across the Pacific Ocean from Japan to the coast of British Columbia. The warm and moist S.W. Anti-Trade Winds also blow across the ocean and help to keep the west coast warm, but their warming influence is not much felt beyond the Rocky Mountain barrier. The centre of the continent is very cold because it is far from the sea; icy winds blow from the Arctic regions, and there is no mountain barrier to hinder them. Compare this with Asia, where the mountains run from west to east and prevent the cold northern winds from reaching India. The east coast feels the moderating influence of the sea, but there is a cold current flowing southwards. So New York, although in the same latitude as Naples, is below freezing point in January. In July, when the sun is shining vertically over Mexico, the west coast is kept cool by the influence of the sea, but, the centre of the continent gets very warm. Even as far north as the Arctic Circle the temperature is nearly 60°. On the east coast, the Gulf Stream is stronger than the cold current from the north, and New York is nearly as hot in July as Bombay.

In the north the South-West Anti-Trades blow against the Rocky Mountains. So the northern west coast and the

Pacific slopes of the Rockies get a good rainfall all the year round. The deep valleys between the ranges of the Rocky Mountains are sheltered from the rainy winds and remain dry. The winds from the west do not reach the regions to the east of the Rocky Mountains and so Canada is very cold in winter. When these winds reach the Central Plains they are dry and so the plains get most of their rainfall in summer. South of about latitude 32° the Trade Winds blow, bringing rain to the south-eastern part of U. S. A.,

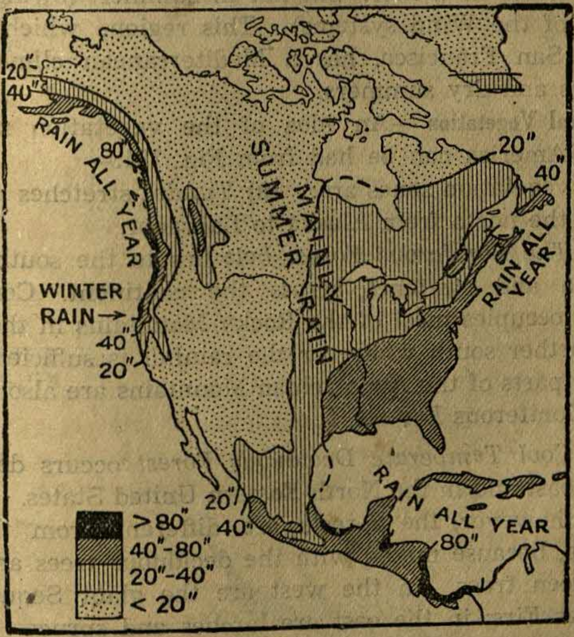

FIG. 183.—The Rainfall of North America.

Notice very carefully the good constant rainfall where the Anti-trade winds or Trade winds are blowing for the whole year. Notice the dry plateaux between the main crest of the Rockies and the coastal ranges (rain shadow area.) Notice how the rainfall decreases from the Atlantic coast inland.

the West Indies and Central America. By the time they cross the mountains they become dry and so the west coast has drought in winter. But in the summer the sun makes the plateau of Mexico very hot, and the local monsoon blows from the Pacific Ocean. Further north on the west coast there is a small region where the Westerly Winds blow in winter, but not in summer (owing to the swing of the Wind systems). This region, which centres round San Francisco, has a Mediterranean climate—wet winters and dry summers.

**Natural Vegetation.**—An idea of the vegetation zones of North America can be had from Fig. 184:—

The vegetation zones are: (a) *Tundra* stretches as a belt across the north from Alaska to Labrador.

(b) *The Coniferous Forest belt* lies to the south of the Tundra and stretches across the continent. Coniferous Forest occupies most of the Rocky Mountains in the north, and farther south wherever the rainfall is sufficient. The higher parts of the Appalachian Mountains are also covered with Coniferous Forests.

(c) *Cool Temperate Deciduous Forest* occurs down the west coast and in the North-Eastern United States. In both cases, however, the forests are different from those of Europe, because mixed with the deciduous trees are many evergreen trees. In the west are the giant Sequoia and Douglas Firs; in the east are larches and spruces.

(d) *Temperate Grasslands or Prairies* occupy a great triangle in the centre of the continent. They gradually get drier towards the west.

(e) *Mediterranean Vegetation* occupies a small area on the Pacific coast.

(f) *Deserts* occupy the dry plateaux of the Rocky Mountains in the United States and Mexico.

(g) *Warm Temperate Forests* occupy the south-eastern part of the United States.

(h) *Hot Wet Evergreen Forests* occupy Central America and the West Indies.

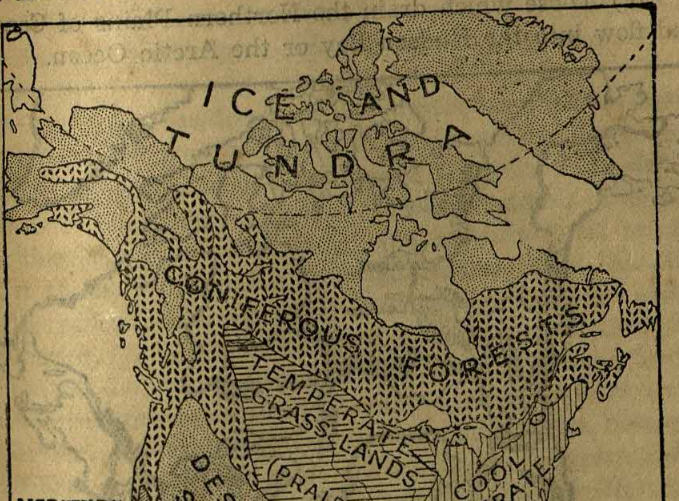

FIG. 184.—The Vegetation of North America.

## RIVERS AND LAKES OF NORTH AMERICA.

There are three groups of rivers:—

(*a*) Those which drain the Rocky Mountain System and flow to the Pacific Ocean.

(*b*) Those which drain the Central Plains and flow, as a rule, to the Atlantic Ocean.

(*c*) Those which drain the Northern Plains of Canada and flow into the Hudson Bay or the Arctic Ocean.

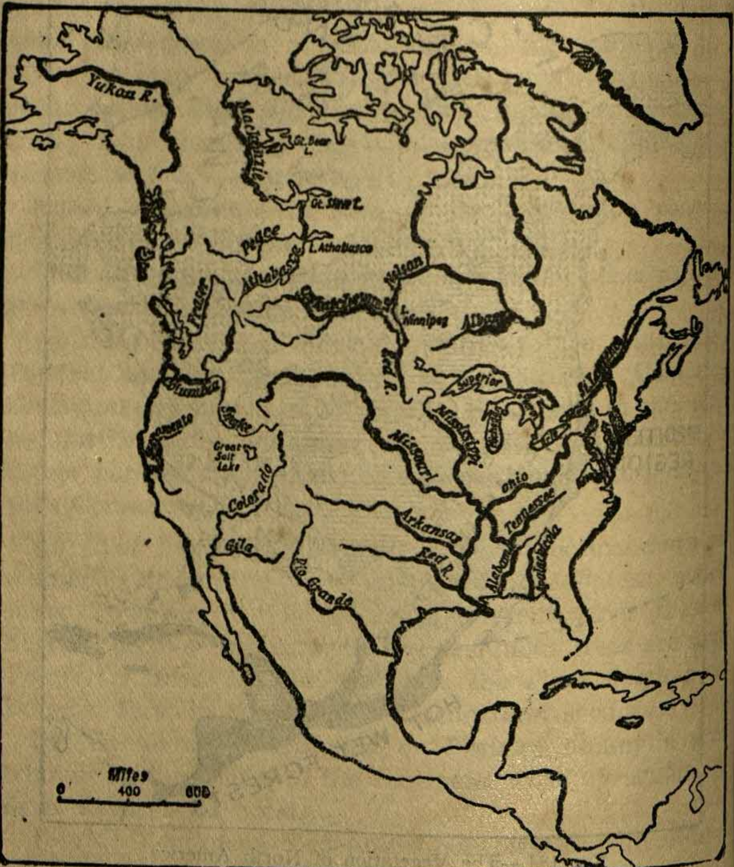

FIG. 185.—The rivers of North America: navigable parts shown dark.

(*a*) Belonging to the first group are the *Yukon* in the cold north, the *Fraser* in Canada, the *Columbia* with its tributary, the *Colorado,* famous for its canyon, in the United States. Amidst the Rocky Mountains there are numerous lakes, the largest being the Salt Lake of Utah. This lake is in a very dry part of the United States and has no outlet to the sea.

(*b*) All over the lowlands are numerous shallow lakes. In the far north are the Great Slave Lake and the Great Bear Lake which drain by the Mackenzie River into the Arctic Ocean. In the centre of Canada is Lake Winnipeg. Flowing into this lake is the Red River, and the lake itself has an outlet to the Hudson Bay through Nelson River. On the borders of Canada and the United States are the Great Lakes —Superior, Michigan, Huron, Erie, and Ontario—all draining by the St. Lawrence River to the Atlantic Ocean. These lakes form a fine navigable waterway, from the west of Lake Superior to the east of Lake Erie, but farther east, between Lake Erie and Lake Ontario, are the famous Niagara Falls. A canal has now been built round the falls, so that the smaller ocean steamers can pass from the Atlantic right into Lake Superior. Nearly the whole of the Central Plains in the United States are in the basin of the Mississippi River. Notice the tributaries of this river—the Missouri and Red rivers from the west and the Ohio from the east. The main river flows southwards into the Gulf of Mexico. The rivers down the east coast of the United States are short, but important, because they have cut gaps through the Appalachian Mountains and the easiest routes from the coast inland are along the river valleys, the most important being the Hudson and its tributaries.

In North America, we have examples of different types of rivers. The water drains through a succession of lakes and then through a rapid stretch (which cannot be used for ocean-going vessels) to the mouth of St. Lawrence past Montreal and Quebec. The great lakes are quite as large as seas, and their chief disadvantage is that in the winter the

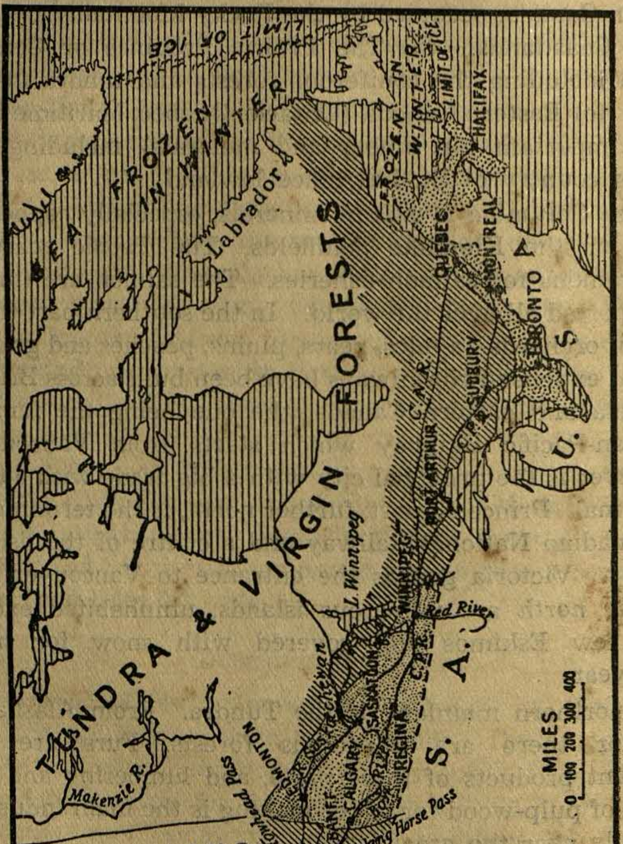

FIG. 186.—Canada, Economic.

*Cobalt* are large deposits of silver ore, where more cobalt ore is available than the world needs. Gold is also found at Porcupine and Kirkland Lakes, and these regions now produce four-fifths of the gold of Canada.

*The Prairies of Canada* form part of the great triangle of treeless grassland in the centre of the North American Continent. Wheat can be grown wherever the temperature is 60° or more for at least three months of the year. In 1928, the Prairies of Canada, with only 2,000,000 people, sowed 23,000,000 acres of wheat and produced 500,000,000 bushels of wheat; the Province of the Punjab, with 20,000,000 people, sowed 7,000,000 acres of wheat and produced 100,000,000 bushels.

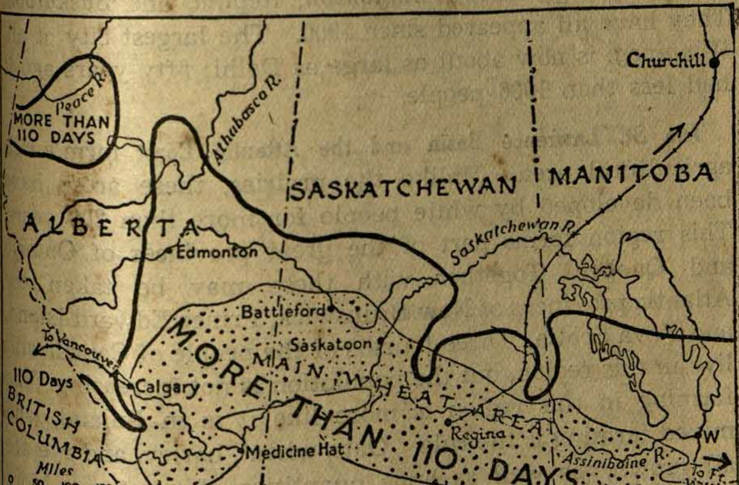

FIG. 187.—Development of the Prairies.

In this area, too, enormous quantities of oats and barley are produced and on the poorer soil, rye. The oats and barley are often grown towards the north, in regions a little too cold for wheat. Another crop is flax, whilst large quantities of fodder are grown for feeding cattle. Large number of eggs are produced, as well as butter. There are large numbers, too, of pigs.

| | Horses. | Cattle. | Sheep. | Swine. | Poultry. |
|---|---|---|---|---|---|
| 1901 | 339,989 | 941,625 | 189,665 | 200,231 | 1,717,019 |
| 1911 | 1,194,995 | 1,808,931 | 285,130 | 712,222 | 8,132,423 |
| 1923 | 2,328,851 | 3,747,722 | 469,576 | 1,677,784 | 19,020,966 |
| 1926 | 2,390,274 | 3,528,410 | 514,260 | 1,714,560 | 19,357,621 |
| 1931 | 2,062,684 | 3,300,000 | 1,282,310 | 2,390,990 | 26,000,000 |

The Prairies of Canada have been developed with great rapidity. In 1900 the area under crops was only one-tenth of what it is now; the population only one-fifth; there was not a single town with 50,000 people. The marvellous development has been made possible by the railways. The towns of the prairies are grain-collecting centres—*Calgary* (the ranching centre), *Edmonton, Regina,* and *Saskatoon.* They have all appeared since 1900. The largest city of all, *Winnipeg,* is now about as large as Delhi; fifty years ago it had less than 1000 people.

**The St. Lawrence Basin and the Atlantic Coast** form a rich agricultural area. Unlike the prairies, these areas have been developed by white people for more than 200 years. This region forms part of the great provinces of Ontario and Quebec. Together with these may be taken the Atlantic provinces of New Brunswick, Prince Edward Island, and Nova Scotia. Three-fourths of the people of Canada still live in this region, but the population is not increasing. The farming in this region is more like it is in Enland, and mixed farming is the rule. Oats, wheat, barley, and rye are all grown, as well as huge quantities of potatoes. More important still is dairy farming. More than half the cows of Canada are in the region, as well as two-thirds of the sheep, pigs, and poultry. The valleys of Nova Scotia, New Brunswick, and Ontario are celebrated for their fruit orchards, especially of apples. Fishing is carried on both near the coast itself and farther out to sea on the Great Banks. Nova Scotia and New Brunswick have important coalfields, and

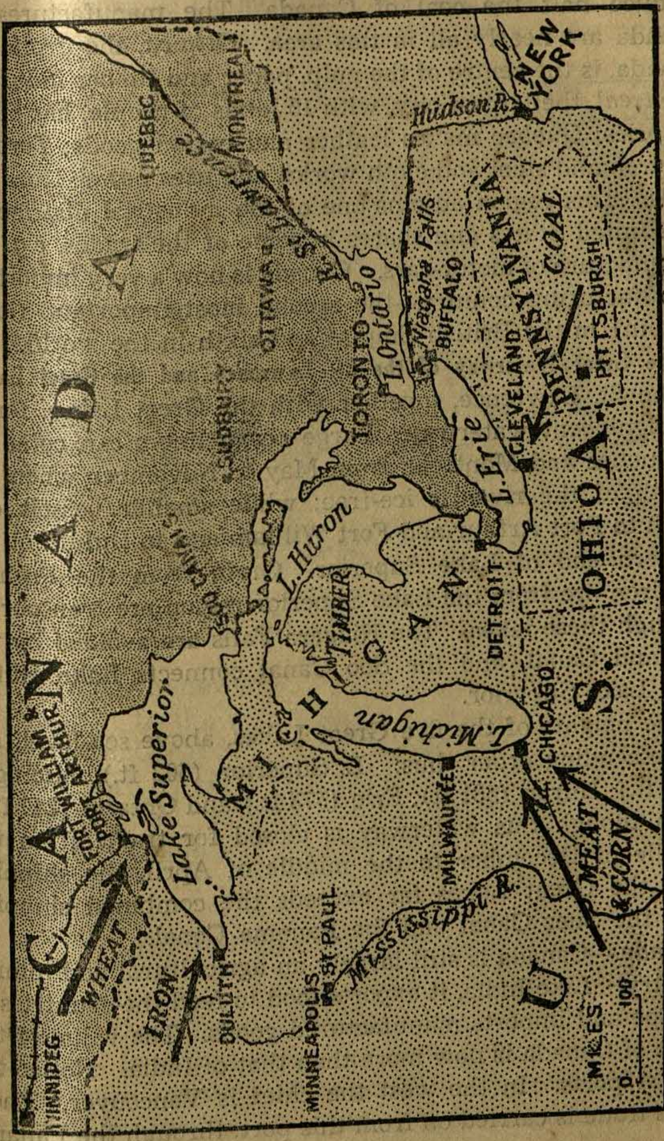

FIG. 188.—The Regions of the Great Lakes.

produce half the coal of Canada. The manufactures of Canada are nearly all in this area. *Ottawa*, the capital of Canada, is the centre of the pulp, paper and timber industry; *Montreal*, the largest city, with 10 lakhs of people, has many factories; *Quebec* makes leather and cotton goods; *Toronto* has iron and steel and cloth works, and uses power from the Falls. This region adjoins one of the industrial districts of the United States and shares in some of the trades, *e.g.* the manufacture of motor-cars. Canada is now a very important manufacturing country—the second most important (after Britain) in the British Empire and sixth in the world.

**The Great Waterway of the St. Lawrence and the Great Lakes.**—The St. Lawrence, together with the Great Lakes, forms a magnificent waterway. Large ocean liners can come up to Quebec and Montreal, from May to November when the mouth of the river is ice-free; while smaller vessels can reach to Port Arthur and Fort William and to Duluth at the western end of Lake Superior. Grain from the Prairies and iron ore from the Lake Superior region are transported through these lakes. The Niagara Falls are avoided by the Welland Canal, and the Soo Canal connects Lake Huron with Lake Superior.

The heights of the five Great Lakes, above sea-level, are in descending order thus: L. Superior (602 ft.), Michigan (581 ft.), Huron (581 ft). Erie (573 ft.) and Ontario (247 ft.). Even though this waterway is closed for traffic from the middle of December to the middle of April, the shipping over the Great Lakes far exceeds the combined shipping over the Suez Canal and the Panama Canal.

*Trade.*—Canada is still largely an agricultural and mining country. Like India, it exports food to feed the countries of Europe and imports manufactured goods. The value of the trade of Canada is now more than that of India. Notice the largest ports. In the west the chief is Vancouver. Enormous trade is carried on from this port, through the Panama

Canal, to ports in China, Japan and Australia. In the east are Montreal, St. John, Halifax, and Quebec. An attempt is being made to develop Churchill on Hudson Bay; it is the nearest port to the wheatlands. 30 to 40 per cent of the exports go to Great Britain, 40 per cent to the United States; of the imports 17 per cent come from Great Britain, 65 per cent from U.S.A. There is very little trade between India and Canada. Both are agricultural countries and they are very far apart.

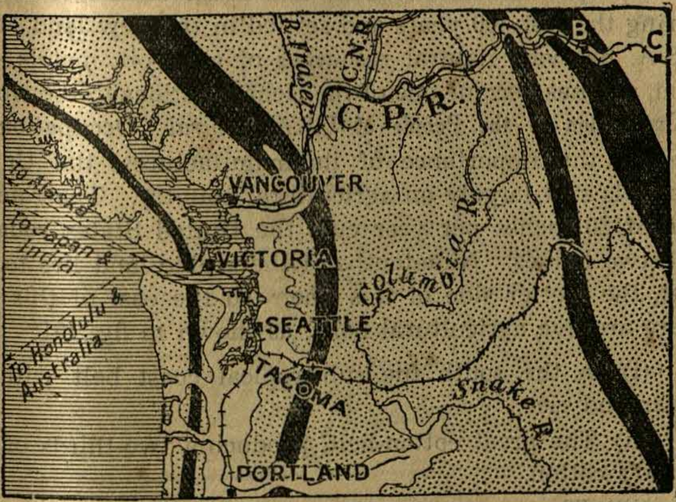

FIG. 189.—The Position of Vancouver.

## THE UNITED STATES OF AMERICA

This great republic is situated almost entirely in the Temperate Zone, and has 123,000,000 people, whilst Canada has 10,000,000. It is thus twice the size of Geographical India and has about one-third of the people. About 330,000 people are American Indians, descendants of the original natives of the continent; 12,000,000 are Negroes, descendants of slaves brought originally from Africa, whilst the remainder are white people who have left the crowded countries of Europe during the last 300 years and settled in the new land. The U.S.A. has vast natural resources of coal, oil, metals, and land, and has become one of the richest nations in the world.

**Occupation of the People of U.S.A.**—*Rural Occupations.*—Despite the importance of its manufactures, the United States is still largely an agricultural country. The rainfall line of 20 inches per year cuts the United States roughly into two halves. Nine-tenths of the arable land lies to the east, the wetter side of this line. To the east of this line there are five agricultural belts, as shown in fig. 191:

(i) In the south the sub-tropical coast belt with its sugar and rice.

(ii) The great cotton-belt, producing two-thirds of the world's cotton.

(iii) The corn and winter wheat belt.

(iv) The corn belt, centring on the north-west.

(v) The mixed dairy-farming belt of the north-east.

To the west of the line lie:

(i) The stock-farming country of the Great Plains.

(ii) The sheep lands of the Inter-montane plateaus.

(iii) The grain and fruit belt of the wetter plateaus and of the Pacific coast.

**Winter Wheat** in America is known as 'Fall' wheat. It is sown in autumn or 'fall', lies in the ground, protected from frost by a layer of snow during the winter, and begins to grow actively in spring. This variety can be grown only where the cold of the winter is not so intense as to freeze the ground hard and injure the young plants.

*Spring Wheats* are sown in the spring, and are ready for reaping at the same time as the winter wheat. These are grown where the winter cold is more severe (e.g. in the Canadian prairies).

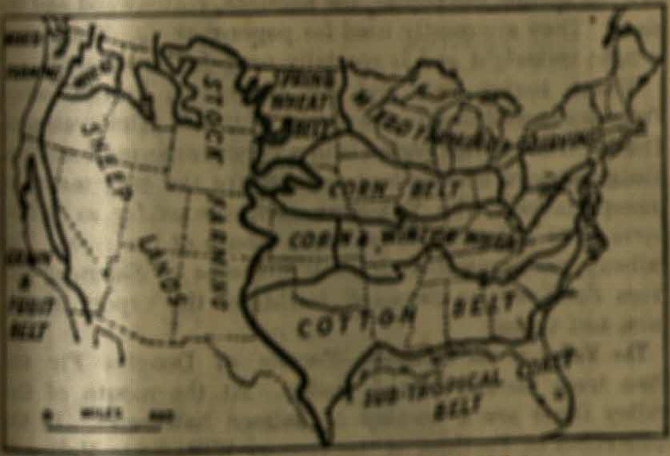

FIG. 196—The agricultural regions of U.S.A.

Corn or maize is the largest cereal crop in U.S.A. It goes to the factories 'on the hoof', the corn being fed to pigs, cattle, Horses, poultry and sheep.

We shall now consider some principal industrial areas of the United States of America:

**The Yukon Valley.**—Gold was first discovered in this valley in 1869. Later, in 1896, was the famous Klondyke 'Gold Rush', which brought the city of Dawson into prominence. The climate of the region is very cold. The range of temperature is very great—from −60°F. in winter to +80°F. in summer. Summer is of a very short duration here. Yet the duration of sunlight in summer is long, with the result that the amount of sun-heat received in this part during the three summer months is equivalent to the amount of sun-heat received during five months in regions of low latitudes. The melting snow in summer contributes to the growth of vegetation. There are to be found evergreen trees like the spruce, the poplar, the hemlock, cottonwood and the birch. They are mostly used for paper-making. The spruce is light in weight and is specially used for aeroplanes.

Wheat, barley, oats and rye are grown in the valley. Fisheries specialising in the export of tinned salmon abound. The fur trade of this region is in a very prospering condition. Sledges drawn by reindeer or dogs are the only means of transportation. The Yukon is navigable as far as *Whitehorse,* 1500 miles inland from the mouth of the river. The railway communication from *Whitehorse* to *Skagway* and from *Fairbanks* to *Seaward,* facilitates the export of fish, furs, and timber.

**The Valley of the Columbia.**—Forests of Douglas Fir and Pine trees abound in this valley. At the mouth of this valley there are a number of Salmon hatcheries. In the hinterland of *Portland* is the famous *Willamette Valley* in which potatoes, vegetables and fruit are grown. This region is very deficient in rainfall; yet the deficiency is made good by irrigation schemes. *Astoria* is a famous port at the mouth of the Columbia.

**The Sacramento-San-Joaquin Valley.** —This fertile valley, drained by the Sacramento from the north, and by the San-Joaquin from the south, has scanty rainfall and necessitates irrigation. Wheat is the chief cereal, and cotton and rice are also grown in this valley. Fruit-packing and canning are important occupations.

*San Francisco* is the principal town of this valley. It is situated at the only entrance to the valley, and forms the chief port on the western coast of America. The narrow outlet to the Pacific Ocean is known as the Golden Gate.

*The Mediterranean Region* stretches from the borders of Mexico (32° N. to about 42° N.) and includes the greater part of the State of California. Large tracts are now rigated and used for fruit-farming. California is famous

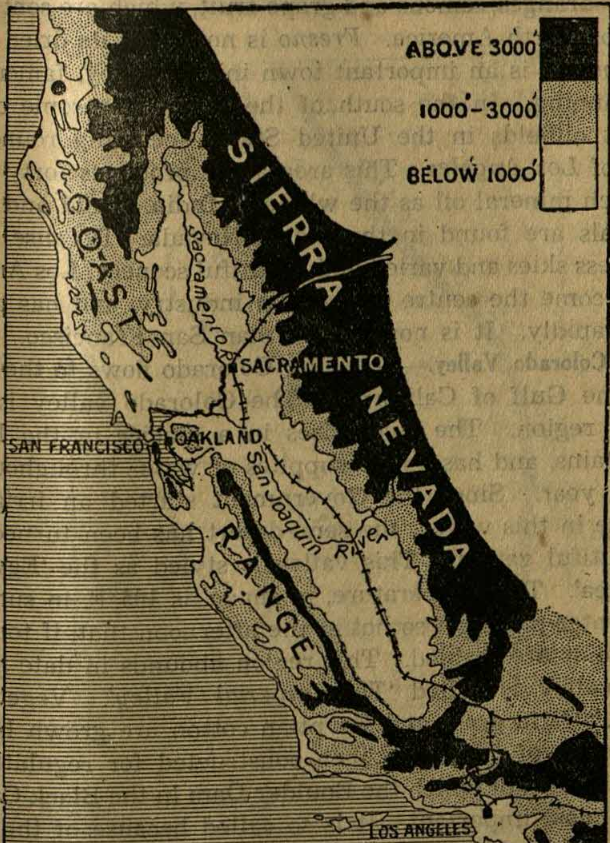

FIG. 191.—The position of San Francisco.

r its fruits and the fruit-tinning industry is an important one—peaches, apricots, pears, plums, cherries, etc.,—are all grown and tinned. Equally important are the fresh "citrus" fruits—oranges, lemons and grape-fruit, which are sent to all parts of North America. *Fresno* is noted for its dried fruit. *Sacramento* is an important town in the valley, famous for fruitcanning. In the south of the region are some of the largest oilfields in the United States—centring round the town of *Los Angeles.* This area alone produces forty times as much mineral oil as the whole of India. Gold and other minerals are found in the Sierra Nevada. Because of its cloudless skies and varied and beautiful scenery, Los Angeles has become the centre of the film industry, and has grown very rapidly. It is now larger than San Francisco.

**The Colorado Valley.**—The river Colorado flows to the south into the Gulf of California. The Colorado valley is in a desert region. The river rises in a glacier in the Rocky Mountains, and has ample supplies of water throughout the whole year. Since the Government started an irrigation scheme in this valley, the semi-desert has been turned into a beautiful garden. This valley is styled as the 'Egypt of America'. The temperature, in shade, is 105°F. in summer. The water-pipes get so hot in the afternoon that, if touched, the hands are scalded. This region abounds in date palms. This valley is called *'The Imperial Valley'.* Vegetables, maize, alfalfa grass and Egyptian cotton are grown here.

A series of dams has been constructed for regulation of the Colorado, of which the Boulder Dam in the Black Canyon is the most important. It is so called because of the large deposit of boulders to be seen strewn over its valley bottom during the slack water season. Since its completion in 1937, the reservoir waters 3000 sq. miles of irrigable land in California, Arizona and Nevada. Power is being transmitted to Loss Angeles 250 miles away. The cheap power will lead to a varied industrial development. With a height of 726 ft. the Boulder Dam is the highest in the world.

*The Mississippi Valley* is the great agricultural region of the United States. It is continuation of the rich wheatlands of Canada. Over the north enormous quantities of wheat are grown, all over the south maize is the great crop. Flour-milling has naturally become an important industry, the chief centres being *Minneapolis, Chicago,* and *St. Louis.* St. Louis is situated at the junction of the Missouri and Mississippi rivers, and is the highest point which can be reached by large steamers. Nearly half the cattle of the United States, and more than half the pigs, are found in the maize belt. Cattle from the drier western lands are fattened here. The tinning of meat is a very important industry at Chicago

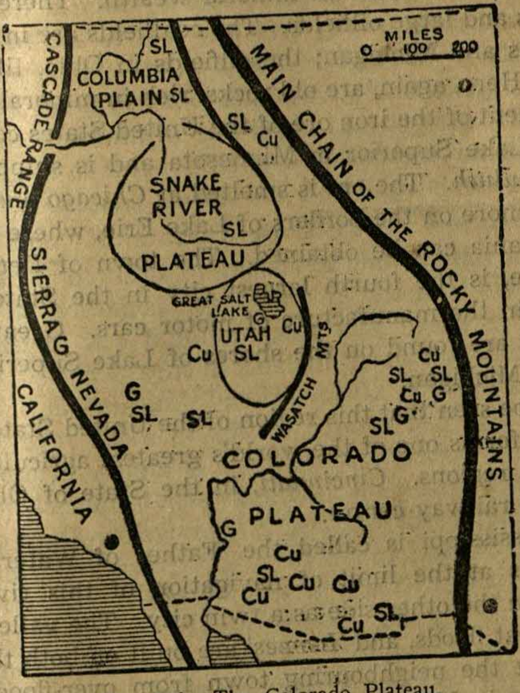

FIG. 192.—The Colorado Plateau.

and *Kansas City*. *Chicago* produces more than a quarter of the whole supply of tinned meat of the U.S.A. *Indianapolis* is another important centre. In addition to its agriculture, this region has enormous mineral wealth. There are large coalfields and large oilfields. The coalfields are in the States of Illinois and Michigan; the oilfields in Ohio, Illinois, and Kansas. Here, again, are old rocks, rich in minerals. Eighty-five per cent of the iron ore of the United States comes from west of Lake Superior in Minnesota and is shipped at the port of *Duluth*. The ore is smelted at *Chicago* and *Milwaukee*, but more on the borders of Lake Erie, where coal from Pennsylvania can be obtained. The town of *Detroit*, near Lake Erie, is the fourth largest city in the States, and is engaged in the manufacture of motor cars. Great deposits of copper are found on the shores of Lake Superior in the State of Michigan.

It will be seen that this region of the United States is very rich, and forms one of the world's greatest agricultural and industrial regions. *Cincinnati*, in the State of Ohio, is an important railway centre.

The Mississippi is called the 'Father of Waters'. *Minneapolis* is at the limit of navigation of this river, with *St. Paul* on the other side as a twin city. The valley is subject to great floods, and '*Levees*' are built on both the banks to prevent the neighbouring town from over-flooding. In 1936 *St. Louis*, *Memphis* and *New Orleans* suffered from the devastating floods of the river.

*The South-Eastern Region*, comprising the lowlands round the Gulf of Mexico and the Atlantic Coastal Plain, is the greatest cotton-growing region in the world, and produces more than half the world's supply of raw cotton. 'Cotton is King' is a common phrase used in this region. The cultivation of cotton has gradually spread over nearly all the suitable land, so that in the future to get more cotton it will be necessary to improve the yield—that is, to get more cotton from the same area of the land. The cotton grown is the good American upland cotton, which in India only grows on the best irrigated land. The most important food grain in this region is maize, which occupies more land than wheat. Large quantities of rice are also grown, sufficient for the needs of the whole of the U.S.A. Sugarcane is also grown. Forests still cover considerable areas. This being a hot part most of the workers in the fields are negroes. The great town and port of this region is *New Orleans*, on the Mississippi. New Orleans forms the Southern Gateway of the United States. It is also a wheat-port. Wheat is poured into the holds of ships by means of chutes attached to elevators. Flat-bottomed boats carrying loads of cotton down the Mississippi is a familiar scene that meets a traveller's eye. Raw cotton is sent to England from the ports of New Orleans and Galveston. The Peninsula of Florida does not grow cotton; it has a delightful climate and is a favourite holiday resort. *Miami* is an important town.

*The Appalachian Region* stretches from Lake Ontario and Lake Erie south-westwards. This important region contains more than one-third of the total population of the U.S.A. Much of the land is too hilly to be cultivated, but there are numerous sheltered valleys where mixed farming and dairy-farming can be carried on. It has enormous supplies of coal—especially in the north where the Pennsylvania coalfield produces as mtich coal as the whole of the British Isles, and more than half the total obtained in the States. Some of the coal is exported *via* the Great Lakes to Canada, or through the river gaps to the ports of Philadelphia, Baltimore, etc. A great iron and steel industry has grown up on the coalfields. The great centres are *Pittsburg*, *Homestead*, *Cleveland*, and *Buffalo*. Notice that the last two are on the lake shores. The country round Pittsburg is called "The Black Country of the United States". The manufacture of woolen goods in centred round *Philadelphia*, whilst silk goods are made in the States of Pennsylvania, New Jersey, and New York. Clothing is made especially in New York. A considerable amount of paper is made from the trees of the hilly regions. Notice carefully the wonderful position of *New York* as one of the outlets of this region, and also of *Newark, Jersey City, Philadelphia,* and *Baltimore. Washington,* the beautiful capital of the United States, is on the Atlantic border of this region.

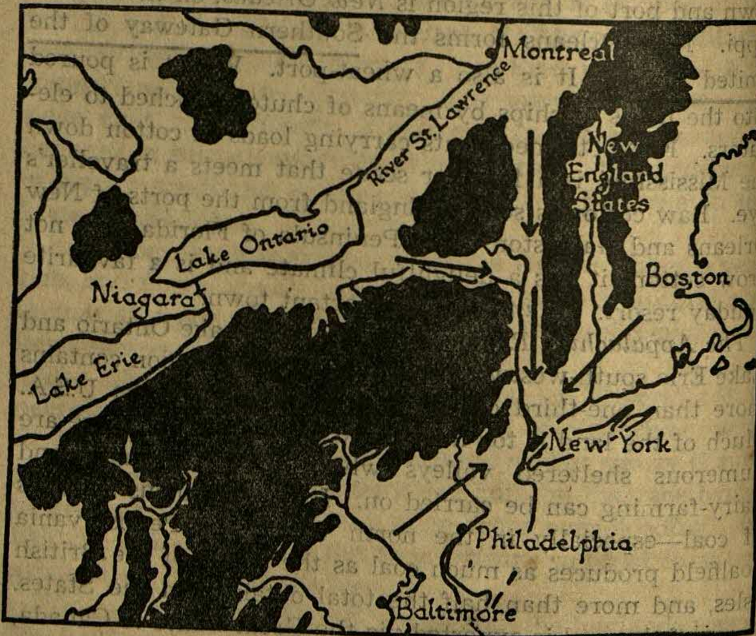

FIG. 193.—Sketch map showing the position of New York.

The high land, shown in black, is broken by only one complete gap, that of the Hudson and Mohawk rivers behind New York.

*The New England States* to the N.E. was the part of America where the first colonists settled. They carried on farming in the valleys and lowlands. This is still a region of mixed farming similar to that of the British Isles. But the colonists brought various trades with them, and gradually industries sprang up. The moist climate was suitable for cotton manufacture; plenty of water and water-power was available. New England States furnish a unique example of a highly industrial region which has to import most of its raw materials and also coal and iron. New England has an abundant supply of water-power and of trained men from Britain. The industry grew up beyond the capacity of the power obtained from the waterfalls, and now coal is the chief source of power. Many of the towns are situated on what is called the "Fall Line", where the rivers come tumbling down from the mountains to the plans. Coal is available from Nova Scotia and Pennsylvania; there are good ports facing the busy countries of Europe. So nearly two-thirds of the cotton goods of the U.S.A. are made in this region—at *Fall River, Manchester, Providence,* etc. Very important, too, are woollen manufactures. *Boston* is the great wool market of America. Boots and shoes are also made in this area. There is little iron ore available, but small articles such as cutlery and hardware, as well as brass work, etc., are made in this region. Large areas of New England are still forested, and nearly half the wood-pulp of the U.S. comes from this region. Fishing is important along the coasts. *Boston* is the principal port of the region.

**Communications.**—The United States have two great systems of inland waterways. One is the Great Lakes System. Lakes Superior and Huron are joined by the "Soo" Canal—the total tonnage of vessels passing through this canal is three times that passing through the Suez Canal. The Erie Canal connects Lake Erie with the Hudson River and so with New York, but it is too small for modern needs. The Mississippi and its tributaries form the other great water highway. But it flows southwards and most of the trade is from west to east. The United States have a quarter of a million miles of railway—the American railways are long enough to go round the world at the equator ten times. Just as in Canada, the agricultural development followed the railways—the railways made it possible.

**Trade.**—The United States form such a huge territory, and have such a range of climates and productions, that they are almost self-supporting. They have besides a huge foreign trade—about the same in value as that of the British Isles. The imports are mainly raw materials which are produced in countries having a warmer climate than the U.S.A.—cane sugar, coffee, rubber, silk, jute, etc. The exports are both agricultural products and manufactured goods. By far the most important is raw cotton—sent largely to Great Britain, France, and Germany.

**Trade between India and the U.S.A.**—India sells to the U.S.A. goat-skins and sheep-skins, lac, manganese ore, mica, castor-oil seeds, spices, tea, and above all, raw jute and jute cloth. India buys in exchange iron and steel goods, machinery (including motors) and hardware, mineral oil, and tinned goods.

## MEXICO

**Mexico** is a large republic, nearly half the size of India without Burma, and with a population of fourteen millions. Mexico was a colony of Spain from 1521 to 1822, and most of the inhabitants are descended from Spanish settlers and from the native American Indians. The country is unsettled, and there have been many revolutions within the last hundred years.

*The Tropical Coastlands* are suitable for cane sugar, rubber, vanilla, and tobacco, and in settled times good crops are obtained. Sisal hemp comes from Yucatan.

*The Temperate Hill Slopes* produce good coffee and large quantities of maize, the staple food of the people.

*The Plateau* suffers from poor rainfall and irrigation is needed for cotton, wheat, and maize. Sheep and cattle are reared.

Mexico is famous for its mineral wealth and produces nearly half the world's silver and huge quantities of copper. On the flanks of the mountains are the famous oilfields which were first worked about 1910. Mexico produces about 8 per cent. of the world's supply, or nearly ten times as much as India. *Tampico* is the great oil port. Hydro-electric power is available, and a few cotton goods are made at *Vera Cruz*. *Mexico* is the largest city, capital of the republic and near the important silver-mining regions.

## CENTRAL AMERICA

**Central America** consists of the six small republics of Guatemala, Salvador, Honduras, Nicaragua, Costa Rica, and Panama, with the British Colony of Honduras.

A broad backbone of mountains runs through the countries. There is a narrow coastal plain on either side. The rainfall on the Atlantic side is derived from the Trade Winds, and is heavier than on the west. The geographical features are:

(*a*) Tropical plains, producing sugar, bananas, coconuts and hard timbers.

(*b*) Temperate hill slopes, producing coffee.

(c) Cool grass-covered highlands.

As in Mexico, the inhabitants are of Spanish-Indian descent.

*The Republic of Panama* occupies the narrowest part of the isthmus between North and South America. Many years ago the Frenchman who built the Suez Canal tried to construct a canal across the Isthmus of Panama, but he failed. In 1904 the United States purchased a strip of land ten miles wide from Panama and spent one hundred and fifty crores of rupees in building the Panama Canal. The canal was finished in 1914. It belongs to the United States, but it may be used by vessels of all nations on equal terms. In 1933 about 4,500 ocean steamers went through the canal, mostly American and British. The canal is about thirty-six miles long, but for more than half the distance it runs through an artificial lake. The Panama Canal was much more difficult to construct than the Suez. The Suez Canal passes through flat land, but the Panama Canal has to cross a ridge of hills. This it does by means of locks. The town at the northern or Atlantic end is *Colon;* at the southern or Pacific end is *Panama.*

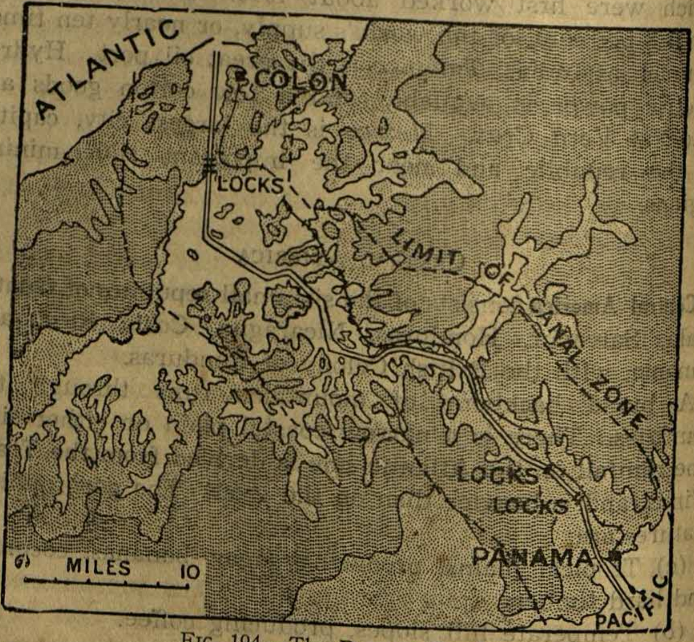

FIG. 194.—The Panama Canal.

Land over 300 feet, heavily dotted; land below 300 feet, lightly dotted. Notice the hilly nature of the Isthmus, the curved course of the Canal and the three locks each end.

*The West Indies* were so called because they were discovered by Columbus when he was trying to find a new route to India. He thought he had reached a part of India. They consist of four large islands and a large number of small ones. Nearly the whole of the group lies within the Tropics.

*Cuba* is a republic, but has been greatly developed by the United States. So that now Cuba produces one-third of the world's supply of cane-sugar. The sugar is exported to the United States. Cuba is also famous for its tobacco, exported from the capital and principal port of Havana.

*Porto Rico* is a much smaller island, belonging to the U.S.A., and again sugar-cane and tobacco are the leading products—together with coffee.

*Haiti* is divided between two Negro republics—the Negroes being the descendants of liberated African slaves. Both republics are very undeveloped.

*Jamaica*, part of the British Empire, is famous for its cane-sugar and bananas, which are exported through the ports of Kingston and Port Antonia.

The smaller islands of the West Indies, known as the "Lesser Antilles", belong mostly to the British Empire, though some are French. They nearly all produce cane-sugar. The island of Trinidad really belongs to South America and produces large quantities of mineral oil and pitch. The pitch is obtained from the famous "pitch lake", and it is valued for tarring metalled roads. Although such a small island, Trinidad produces nearly half as much oil as Burma.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate your answers with diagrams, sketches etc.

1. On a map of North America give the position of the principal sea ports of the United States of America, and state the nature of their trade and the advantages they possess for carrying that trade.

2. Describe the geographical position of the following towns and show how their position has influenced their growth. Draw simple sketch-maps to illustrate your answer:—

New York, New Orleans, Winnipeg, Los Angeles, Chicago, San Francisco.

Vancouver, Montreal, Halifax. (B.U.)

3. Divide North America into the main Natural regions and point out the characteristics of each of the regions. (B. U. 1930)

4. Explain why, giving geographical reasons for:—

(*a*) Coffee is grown in Brazil.

(*b*) Fruit-growing is an important industry in California. (B. U. 1934)

(*c*) Ninety per cent of exports of Newfoundland are made up of fish.

(*d*) U.S.A. exports petroleum. (B. U. 1928)

(*e*) Cuba is important to U.S.A.

(*f*) The population of North America is thicker in the East than in the West.

(*g*) The population of Canada has not increased as much as that of the United States. (B. U. 1933)

(*h*) On a journey from Bombay to New York via Panama Canal you observe the same day twice when crossing the date line. (B. U. 1932)

5. Name the chief occupations of the people of the United States of America and explain the geographical influences that have made the people take to them. (B. U. 1935)

6. Describe how the Mississippi has contributed to the prosperity of the country through which it passes. (B. U. 1929)

7. (*a*) What factors have caused the United States of Americal to become a great industrial country? (*b*) Contrast its industrial development with that of India. (B. U. 1935)

8. Give an account of the occupations of the people in Canada and show to what extent the occupations are influenced by climate and physical features. (B. U. 1925)

9. Describe the chief occupations of the inhabitants of Newfoundland. Show how they depend on climate and physical features. (B. U. 1919)

10. Write a short note on the prairies and describe the chief occupations of the people in them and show how they depend on climate and physical features. (B. U. 1919 & 23)

11. Sketch the following and mark on the sketch the principal towns and chief products.

The St. Lawrence Basin. (B. U. 1930)

12. Give a geographical account of the following:—

(*a*) Canda, (*b*) Mexico. (B. U. 1929 & 33)

13. Explain how geographical conditions affect the life and occupations of the following people:—

(*a*) The Canadians, (*b*) The Negroes. (B. U. 1928)

# CHAPTER XXVI

## EUROPE

**Position and Size.**—With the exception of Australia, Europe s the smallest of the continents, but it is the most densely

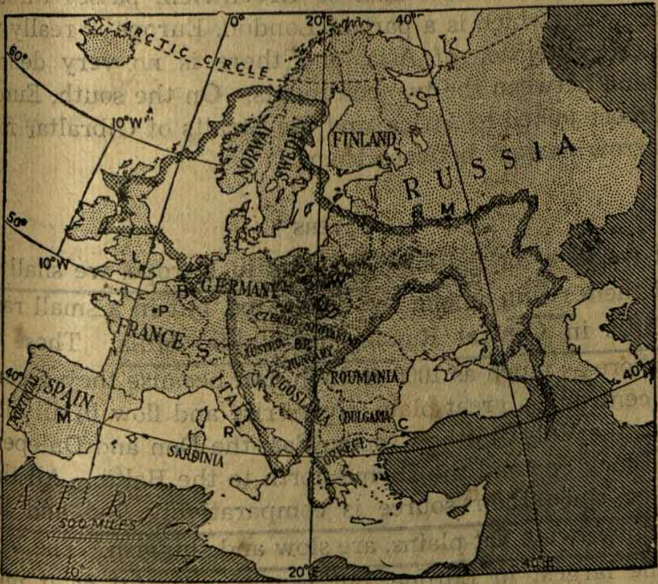

FIG. 195.—The position and size of Europe.

otice the position of the Arctic Circle cutting across the north of the continent and of latitude 40° N., going right through the Mediterranean Sea. The outline of India shows how small Europe is.

pulated. The area of Europe is only 3·8 million square iles, or twice the size of India. In comparison with its size urope has the longest coast-line of any of the continents; erywhere there are inland seas, deep bays and gulfs, so at no part of Europe is 1000 miles from the sea. Compare is with Asia, where the centre of the continent is nearly 00 miles from the sea. Fig. 195 is a map of Europe owing the important lines of the latitude and longitude.

Europe is almost entirely in the North Temperate Zone only a small piece in the north lies inside the Arctic Circle (66½° N.). Notice that the British Isles lie between latitude 50° N. and 60° N. The all-important line of longitude, 0°, the meridian of Greenwich, passes through Greenwich, which is a part of London. Europe is really the western extension of Asia, and there is no very definite division between the two continents. On the south, Europe is almost joined to Africa, and the Straits of Gibraltar form a narrow passage between them.

## RIVERS

If we look for the longest rivers in Europe, we shall *not* find them rising among the high Alps, but in a small range of hills in Central Russia, the Valdai Hills. These are nowhere as much as 1000 ft. high, but because they occur in the centre of a great plain, rivers rise and flow in all directions, the Volga to the Caspian Sea, the Don and Dnieper to the Black Sea and the Dwina north to the Baltic. All these rivers, since their source is comparatively low and they flow over wide flat plains, are slow and sluggish. The Volga is the largest in Europe, but is not so useful as it might otherwise be, because it flows into the Caspian Sea, which is really a great lake.

The useful rivers flow from the Alps. Here we have the Rhine and the Rhone rising close together and flowing, the one north and the other south. Both run through fertile valleys, which are important centres of population and form great highways from south to north. The Rhine, which has the longer course over the flat plain, is the more useful for navigation, and is perhaps the most important river in Europe. Its valley forms a road from the low flat plains of Holland and Belgium right up into the Alps, whence, after crossing a narrow pass, the way is open down to the valley of the Po, another Alpine river, which flows from west to east, its valley forming the fertile part of North Italy.

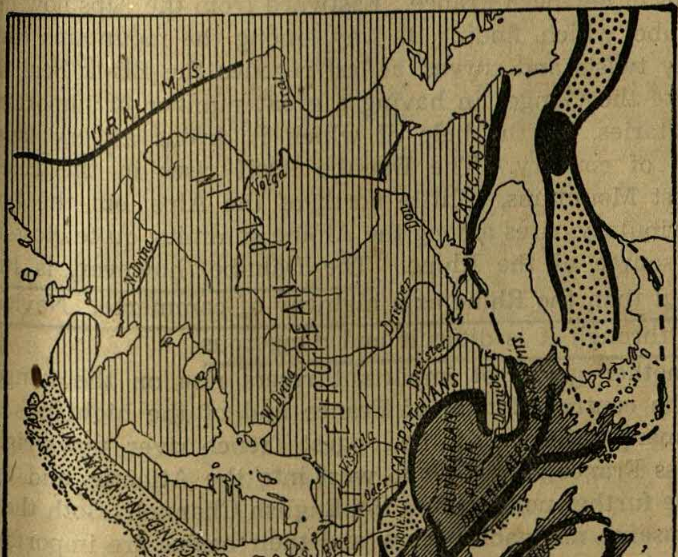

FIG. 196.—The Physical Features of Europe.

This has always been one of the main lines of communication between northern and southern Europe. The Saone joins the Rhone just where it turns southwards after leaving the Alps, and the valleys of these two rivers make again an easy road by which to travel from the Mediterranean to the plains of northern France. Eastward from the Alps flow the Danube, which, finding its way among the mountains with many twists and curves, at last reaches the Black Sea. It is like the Ganges in having a great number of important tributaries, by the help of which it drains a very large tract of country. The Danube itself rises in the Black Forest Mountains, a little north of the Alps, but the Inn, its tributary, rises among the Alpine summits, quite close to the source of the Rhine. The Danube, however, is less useful than the Rhine as a highway of commerce. Navigation through it is difficult and dangerous.

Another group of important rivers rise on the fringes of the central plateau of France and of the highlands of Germany. The Loire, the longest French river, flows right across France from east to west into the Atlantic, and the Seine further north enters the English Channel. Both these are useful, navigable rivers, and their basins are important agricultural districts. North and east of the Rhine come the German rivers Elbe, Oder, Vistula (the Vistula is now mainly in Poland) all rising from the fringe of high land that borders the Northern plain. The first is the most useful of the three, because it flows into the open North Sea, while the other two flow into the enclosed Baltic, from which the only way out is through the narrow straits between Denmark and Sweden.

The Spanish tableland is another watershed for rivers which flow east, south and west. They are mostly short rapid streams, reaching the sea almost as soon as they have descended from the mountains. The valleys of the Ebro in the east and the Guadalquivir in the south provide strips of rich fertile land in what is otherwise a somewhat barren country.

**The Seas and Coast.**—No other continent has so broken a coast line as Europe. Notice the enclosed sea: the Mediterranean, the Black Sea, and the Baltic. The latter runs a very long way up into the land and almost cuts off Scandinavia from the rest of Europe. Then there is the shallow North Sea between the British Isles, Norway and Denmark, the narrow English Channel, running up between England and France, joined to the North Sea by the Straits of Dover; the Bay of Biscay; the Adriatic Sea, a long, narrow gulf between Italy and the Balkan Peninsula; and the Ægean between Greece and Asia Minor. Thus there is very little of Europe that is not more or less influenced by sea. In Asia we find a large area in the centre more than a thousand miles from the sea, in Europe very few places are as much as five hundred miles distant, and this only in Russia. Again many parts of the coast, especially the western coasts of the northern countries and Greece in the south, are very much broken by smaller openings, and in these parts there are a great many small rocky islands. There are several larger islands in the Mediterranean, which are probably, like those of the east coast of Asia, the highest part of lands now submerged by the sea. Find on the map the Balearic Isles, Corsica, Sardinia, Sicily, Crete and Cyprus.

**Climate.**—The climate of Europe is not subject to extremes. There is no tropical belt and most of Europe comes within the moderating influence of the sea, and so has an *Oceanic* climate rather than a *Continental* one. The continent lies in the S. W. Anti-Trade Wind belt and the western coasts are bathed by a warm current—the North Atlantic Drift—which is a continuation of the Gulf Stream. The western part of the continent is thus kept warm, the eastern part—being near the land mass of Central Asia—gets cold. So in the cold season it gets colder and colder as we go from west to east. Notice that the rain-bearing winds come from the west which has more rain than the east. Rain, however, falls over nearly the whole of Europe at this season, but most of it falls where there are mountain ranges to intercept the winds.

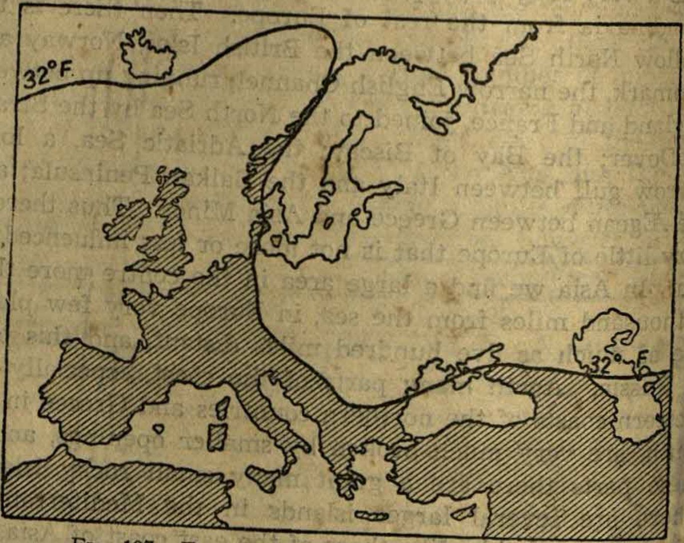

FIG. 197.—Europe: Temperature Map for January.

Notice that on the map of winter conditions the freezing line 32° runs almost due north and south of the western side. It runs along the coast of Norway, across Germany, coming towards the east till it cuts the Black Sea. The British Isles, Holland, Belgium, and France (in fact the equable countries) are outside the cold belt.

At this season the northern part of Europe is under the influence of S. W. Anti-Trade Winds, while the southern part forms a high pressure belt. From this belt many Trade winds start and the Mediterranean lands get hot and receive no rain. Notice that the summer isotherms run from east to west, more or less parallel to the lines of latitude. The south, where the 70° line runs across Spain, Italy, Germany and Austria reaching farther to the north as it goes to the

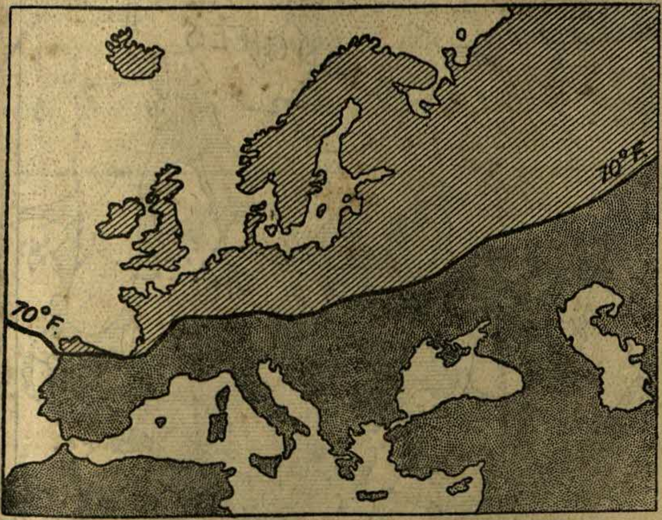

FIG. 198.—Europe: Temperature Map for July.

east, is hot. As we move northwards it becomes cooler but notice that the freezing line is nowhere to be seen.

Notice also that western Europe has the same shading on both maps, which means that there is not a great difference between summer and winter, say about 30° only, while in the north some parts vary from below freezing point in winter to over 70° in summer—i.e. a difference of about 100°. This can be seen from the examples of summer and winter temperatures taken at London, Moscow and Vienna.

Western Europe gets a good rainfall throughout the year. It gradually gets less and less towards the east. Within the freezing line it is too cold to rain in winter, but there is a fair amount of rainfall in summer. There are practically no rainless regions in Europe such as are to be found in other continents. In the southern parts there is rain in winter

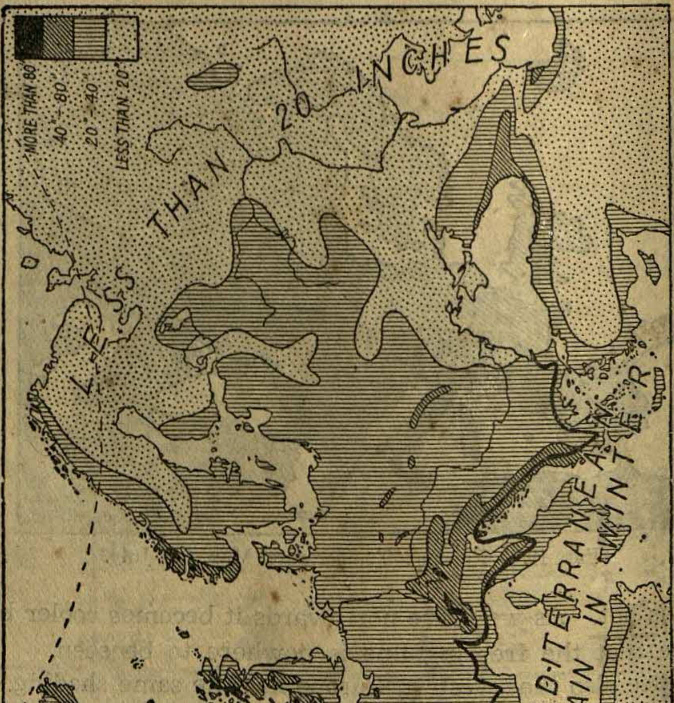

Fig. 199.—Rainfall Map of Europe.

(Mediterranean climate). The Anti-Trade Winds do not blow as regularly as the monsoons. They blow in cyclones and anti-cyclones, and rain falls when there is a cyclone passing over the country. The west coasts of Europe are shaded for heavy rainfall like India, but in the case of Europe the rains are distributed over twelve months, while in India most of the rain comes in four months only.

We may divide Europe with respect to climate into three main divisions—the west with equable climate, the east, extreme, and the south which is part of the Mediterranean belt.

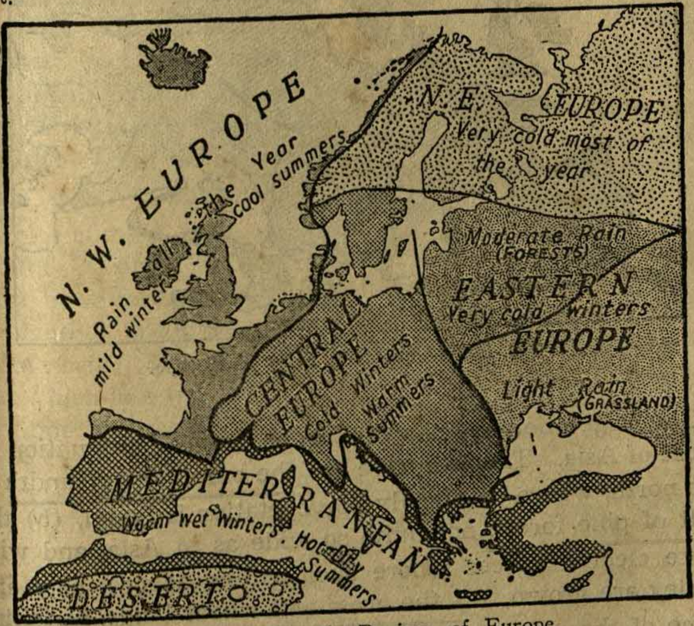

FIG. 200.—Climatic Regions of Europe.

### VEGETATION AND PRODUCTS

The natural vegetation has been removed by man over large areas, especially in Britain, France and Germany. But it is still possible to distinguish the natural vegetation regions,—in fact they can be used as the major natura regions of the continent. Natice how closely the vegetation regions correspond with the climatic regions.

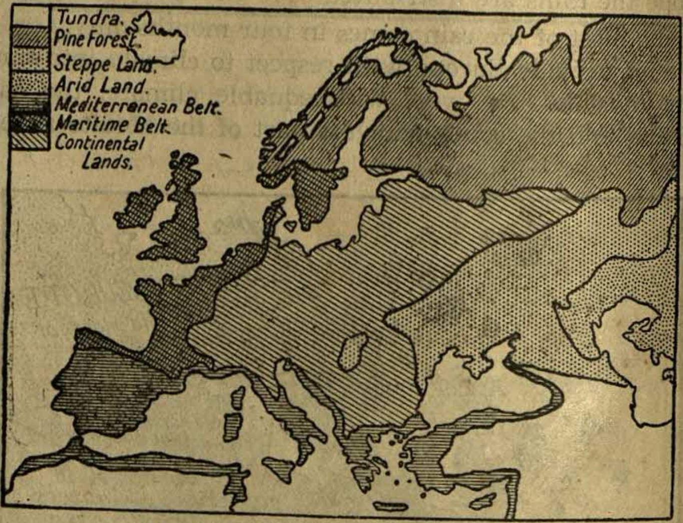

FIG. 201.—Vegetation Belts of Europe.

The vegetation regions of Europe are a continuation of those of Asia. Thus we have (*a*) the bare, snowy tundra of the north, where practically no vegetation is found, (*b*) the belt of pine forest, not quite so wide as in Asia, and with more cleared spaces where such grains as rye, oats and barley are grown, (*c*) the grass and wheat lands, including some of the richest wheat-growing country in the world—the Black Earth regions of southern Russia and Rumania, (*d*) a narrow belt of less fertile steppes round the Caspian Sea, where only poor grass grows, (*e*) the Mediterranean region. Notice that the countries with a slight summer rainfall are good for *grass* and *grain*, which spring up quickly when the rain comes and are harvested before the dry time of year, while a winter rainfall, with hot dry summer, is better for *trees*. Grain, again, can only be grown well near the rivers. Trees, on the other hand, especially those kinds that grow most in these regions (vine, orange, olive) are able to store up the water they get from the winter rain to supply them through the hot dry months. There are also plants, such as the aloe and cactus, which have very thick fleshy leaves or stems in which a great quantity of water can be stored. One tree, important especially in the west part of this belt, is the *cork oak*, from the very thick bark of which bottle corks, life belts and many other things are made. On the hills, walnuts and chestnuts are the important products of the region.

On the west of Europe we find (*f*) the Maritime or Oceanic region, which is not found in Asia, comprising the lands of equable climate and constant rainfall that border the Atlantic Ocean. The natural vegetation of this region is forest; but a forest different both from the tropical forests of the Monsoon and Equatorial lands, and from the pine forest of the north. This is called *deciduous* forest, consisting of trees which lose their leaves every year. In the warm summer time the green leaves spread out. In winter the cold shrivels the leaves up, so about October they all fall off, and the trees stand with bare branches through the cold months, and only when the spring comes and the days begin to grow warmer do the new leaf buds begin to open out. Over the greater part, however, of the Maritime belt the forests have been cut down to make room for cultivation. This is one of the most productive parts of Europe. Wheat is the chief grain. Many vegetables are grown, especially beetroot for sugar, potatoes and turnips. Flax for making linen is another product. Such fruits as apples, pears, plums, cherries, grow abundantly. (*g*) Central grass and woodland. North of the highlands of Germany the ground is poorer than that in the west, and rye, potatoes and beetroot are the chief products. Within the curve of the Carpathian Mountains wheat and vines are grown.

**Population.**—Except in the north or in parts of Russia and the south-east, Europe is inhabited entirely by peoples of the White or Indo-European race. There are three main divisions. The people of the north, the Nordics, are tall, pale coloured, and usually with light hair and eyes. The people of the south, the Mediterranean peoples, are darker skinned, not so tall, and have dark hair and eyes. Between these two, in Russia and Central Europe we find the Alpine peoples, with broad, flat faces and short heads. In the south-east of Europe, on the steppes and the grasslands of Hungary, there are Mongolian peoples (the Magyars of Hungary and the Cossacks of Russia). Look at the

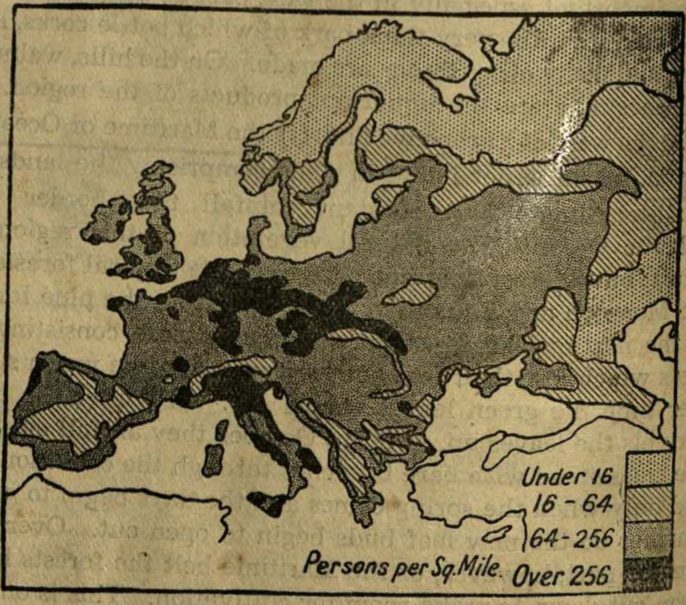

FIG. 202.—Population of Europe.

population map (Fig. 202) and notice where most people live.

Europe is the most thickly populated of all the continents. Though it is the smallest except Australia, it contains one-quarter of the population of the world. The manufacturing parts, that is, those countries which have plenty of coal and iron are the most thickly populated. England, eastern France, Belgium and north Germany, the countries with coal, have over 250 people to the square mile. Some agricultural countries—Holland and Italy for instance—also have over 250. Belgium, which is both agricultural and manufacturing, has the highest average population of any country —650 to the square mile. The most thinly populated parts are the northern parts of Norway, Sweden and Russia.

### People and their Occupations

(*a*) *Fishermen.*—On the west coast of Scandinavia a great many are fishermen. Owing to the warm Gulf Stream, the sea along their shores is never frozen and is full of fish. The coast is broken. Long narrow inlets of calm deep water, called fiords, run up into the land and make excellent harbours, places where the boats can be safe in any storm. On the steep sides the fishermen live, wherever they can find enough flat ground to put their villages. They mostly build their houses of the pine logs that grow on the mountain slopes. They keep their boats in the fiord below, and go out in them to fish in the open sea, sometimes at great distances. Thus the men of Scandinavia have learnt to love the sea (from which they get so much of their living) and to be clever sailors.

Fishing is carried on by the peoples of Great Britain and Ireland, France, Holland, Belgium, Denmark, Germany, the Baltic States, Sweden and Norway. Large quantities of cod, herring and other fish are caught around the coasts and add considerably to the food supplies of the people.

(*b*) *Mountain-dwellers.*—In the Alps are mountain people but these are quite cut off from the sea. They build their houses of wood in the valleys. They grow a few scattered crops for their food, but there is little land flat enough for ploughing, and most of their work is pastoral. On the high mountain slopes there is plenty of good grass, and here they bring their cows to graze in summer time. The herdsmen build little huts on the grazing grounds and live there all the summer. Twice a day the cows must be collected and milked. From the milk butter, cheese and condensed milk are made. In the winter, when the high pastures are covered with snow, they drive the cows back to the valleys, stable them, and feed them on the dry grass they have stored in the summer. They often occupy the long dark evenings by carving wood into many beautiful little figures and toys.

(*c*) *Farmers.*—A great many of the people of Europe are also farmers. They have on the whole a good deal more work to do than the Indian cultivator. As soon as the corn is reaped in the autumn, they plough up some of their fields again, and sow a part of their seed. This sleeps in the ground through the cold winter and begins to grow as soon as spring comes. When the worst of the cold is over, the farmer starts ploughing the rest of his fields, and puts in the rest of his seed. He will have also to consider how he will arrange his crops. He does not grow the same thing year after year, but takes turns—wheat perhaps one year, then turnips for his cattle another year and beans or some such plant another year.

In the river deltas of Asia where new soil is being brought down constantly the same crop can be grown year after year. But in such lands as North-Western Europe, if wheat, for instance, were grown for several years running, it would soon be "starved", because there would not be enough of the food it wanted left in the ground, and it would not grow well. In the early summer the hay must be cut. Then follows the harvesting of the different crops. Perhaps there will also be fruit to gather. The roots, such as turnips, are often left in the ground till quite late in the year and dug up as they are wanted for the cattle's winter food. Thus the farmer is never without something to do.

The Steppes of Russia form one of the famous granaries of Europe. The Ukranian soil is black and fertile—most suited for the growth of wheat. The wheat region in Europe extends from Rumania, over the northern border of the Caspian Sea, to the southern part of Siberia. One-fifth of the world's wheat is raised in this region. It is shipped through the port of *Odessa* on the Black Sea. Winter wheat is sown in the colder parts of Siberia, as in Canada.

Hard varieties of wheat are raised in Germany, Hungary, Rumania and Bulgaria. Intensive agriculture is carried on in Germany. Wheat is grown in France and East Anglia; but the western part of England is too rainy, and the northern part of Scotland is too mountainous for wheat.

Barley can be raised in a poorer soil than that required for wheat. Oats can bear more rain and more cold than wheat, hence the extent of the cultivation of barley and oats is greater than that of wheat. Rye can also be grown in poorer soil and in a colder climate. It is a very popular cereal in Germany.

Beet for sugar is grown in Central Europe. Beet is a crop of the Temperate regions, and requires soil containing calcium. The soil must be capable of being completely drained of extra water. The ideal temperature in summer must be between 60° to 70° F. White people can work on the fields in such temperature, and hence countries like Germany, Russia, Austria, France, Poland, Hungary, Holland, Belgium and Italy have not to depend upon countries in tropical climates for their supplies of sugar.

Fruits like grapes, oranges, lemons, olives, peaches, apricote, figs, almonds, apples, pears and plums are grown in the Mediterranean countries. Wine is extracted from grapes in France, Germany, Italy, Spain and Portugal. Countries to the east of the Mediterranean, which receive more sunlight, specialise in the trade of dry fruits.

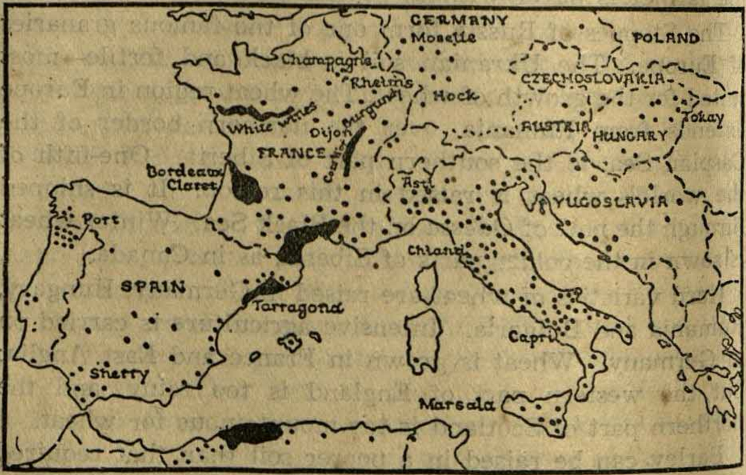

FIG. 203.—Wine lands of Europe.

In France, *champagne* comes from the dry chalk hills of Champagne, *Burgundy* from the slopes of the Côte d'Or, and *claret* from South-Western France near Bordeaux. The *sherry* of Spain derives its name from Jerez, *port* is a name applied to the produce of Portugal from the upper Douro Valley. The white *hocks* are associated with the Rhine Valley, the *Moselles* with the valley of that name. *Chianti* is an Italian product.

Dried figs, currants and raisins are exported from Corinth in Greece and from Smyrna in Turkey. Yugo-Slavia exports dried plums. Spain exports almonds.

The Guadalquivir valley produces the famous Seville oranges. Lemons are the staple product of South Italy and Sicily, and the Jaffa oranges of the coastlands of Palestine.

The Mediterranean region, south of France, is noted for flowers and we find, at Marseilles, perfumeries for the manufacture of scents from orange flowers and violets. Roses are imported from Asia Minor.

(*d*) *Miners.*—Many men in Europe are employed as *miners*, to dig out the coal and iron needed for manufactures.

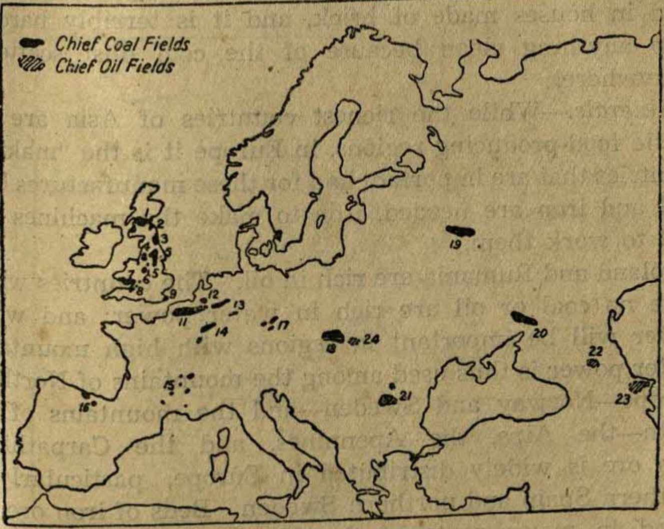

FIG. 204.—Coal and oil in Europe.

COAL-FIELDS.

1—9. British Coal-fields
11. North France-Belgium
12. Campine
13. German Brown Coal
14. Ruhr (Germany)
15. Central France
16. North Spain
17. Saxony
18. Silesia
19. Moscow (Russia)
20. Don (Russia)

OILFIELDS

21. Rumania
22-23. Russia

A coal mine is a very deep pit far under the ground. The men go right down into the dark in a kind of lift. There they work hard, digging out the coal from the sides of narrow passages, which they gradually push further and further into the earth on each side of the central pit. They have to work by the light of lamps, and they must be very careful, as, if they were to cut away too much coal at once, the walls and roofs of the passage might fall down and bury them. They live in villages at the pit head in houses made of brick, and it is terribly hard to keep anything clean because of the coal dust scattered everywhere.

*Minerals.*—While the richest countries of Asia are the fertile food-producing regions, in Europe it is the "making" countries that are important and for these manufactures both coal and iron are needed, iron to make the machines and coal to work them.

Poland and Rumania are rich in oil. The countries which have no coal or oil are rich in water power; and water power will be important in regions with high mountains. Water power is thus used among the mountains of Northern Europe—Norway and Sweden—and the mountains of the south—the Alps, the Apennines, and the Carpathians. Iron ore is widely distributed in Europe, particularly in northern Spain and northern Sweden. Beds of iron ore are found in many parts of the North European plain—in England, in France and Belgium. About half of the iron in the world is made in the United States, but the other principal iron making countries are in Europe. They are Germany, Great Britain, France, Russia and Belgium. If you draw a line from eastern France to Poland you will find on it coalfields all along. Besides the coalfields in Great Britain, important coalfields are found in France and Belgium. Then there are the Ruhr and Dresden coalfields in Germany, the Silesian in Poland and the Don Valley in Russia. The other minerals are less important; and the hard rocks of the Spanish mountains produce copper, silver, lead, zinc and quicksilver. Copper and zinc are also mined in Germany.

*Hydro-electric Power.*—Advantage is taken of water running down the slopes of the Alps, the Scandinavian mountains, and mountain sides in France to generate electricity, or *white coal*, as it is called. The Textile industries in Lombardy, the motor industry of Turin, the aluminium works in Germany and France, the glove industry of Grenoble, and the wood-pulp industries of Norway and Sweden—all utilise electrical power available in the neighbourhood.

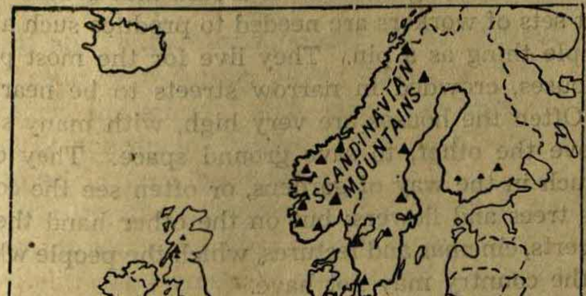

FIG. 205.—Water-power in Europe.

The triangles show the principal Hydro-electric installations. Notice their connection with the main mountain ranges.

(*e*) *Factory workers.*—In the great manufacturing towns are *factory workers.* A factory is a great building in which are a number of machines worked by steam or electricity. The workers have to take care of these machines, see that they are in order, and supply them with raw material. Factories are better looked after now than in the old days; but it must be dull monotonous work. No one ever makes the whole of anything himself. It is said that at least fifteen different sets of workers are needed to produce such a small and simple thing as a pin. They live for the most part in brick houses, crowded in narrow streets to be near their work. Often the houses are very high, with many storeys one above the other, to save ground space. They cannot have much in the way of gardens, or often see the country with its trees and flowers; but on the other hand they can get concerts, cinemas and lectures, which the people who live out in the country may not have.

(*f*) *Cattle-rearers, etc.*—There are few wild animals in Europe compared with other parts of the world. So the tame animals are important. Horses are found all over Europe, and do a great deal of the work, such as ploughing and cart-drawing, which in India falls to the lot of oxen. These horses are large and strong. They can draw heavy weights, but cannot run fast. Other smaller and lighter kinds are used for riding and driving. Cows and sheep are found almost everywhere. The sheep have much thicker wool than those we see in India. They are "shorn" every year in the spring or early summer, i.e., their thick winter coat of wool is cut off and made into yarn, which again is woven into wollen cloth. Pigs too are found throughout Europe. They are especially important in the rather poor land of the German plains, and again in some of the mountainous parts. In the Balkan Peninsula great herds of them run half-wild in the forests, feeding on the small hard nuts of the forest trees which are not fit for men to eat.

## Europe in Transition

The map of Europe has undergone many changes since the beginning of the Twentieth Century. Two great wars against German aggression have plunged almost the entire world into political and economic turmoil. The countries whose frontiers have been most affected by the Second World War (1939-45) are Poland and of course, Germany herself, still, with Austria, under Allied Occupation. Nearly every country in Europe, except those that remained neutral, still show the scars of war—cities and harbours ruined by aerial bombardment, bridges, roads and farms damaged or destroyed in land warfare.

Politically, the countries of Europe have formed themselves into two ideological camps: those countries accepting the totalitarian communist way of life and looking to Soviet Russia for leadership; and on the other hand those countries who are still determined to preserve their democratic freedom, whether it be socialist or liberal or conservative. Between these two camps, there is, unfortunately, much mutual distrust and lack of understanding, which has come to be known as the Iron Curtain—a purely political barrier between groups of differing ideology but forming a serious barrier to commerce and intercourse between the groups.

## THE COUNTRIES OF EUROPE

We shall now say a few words about the different countries of Europe one by one, as they stood before the recent War began.

*The Mountainous North.*—The hilly Scandinavian peninsula is divided into two countries, Norway on the west and Sweden on the east.

### (a) Norway

This is an entirely mountainous country. The most important products are the pine trees on the hills and the fish in the sea. The latter not only give food to the people, but are exported to other countries. The trunks of the tall straight pine trees are very useful for ship masts, and the

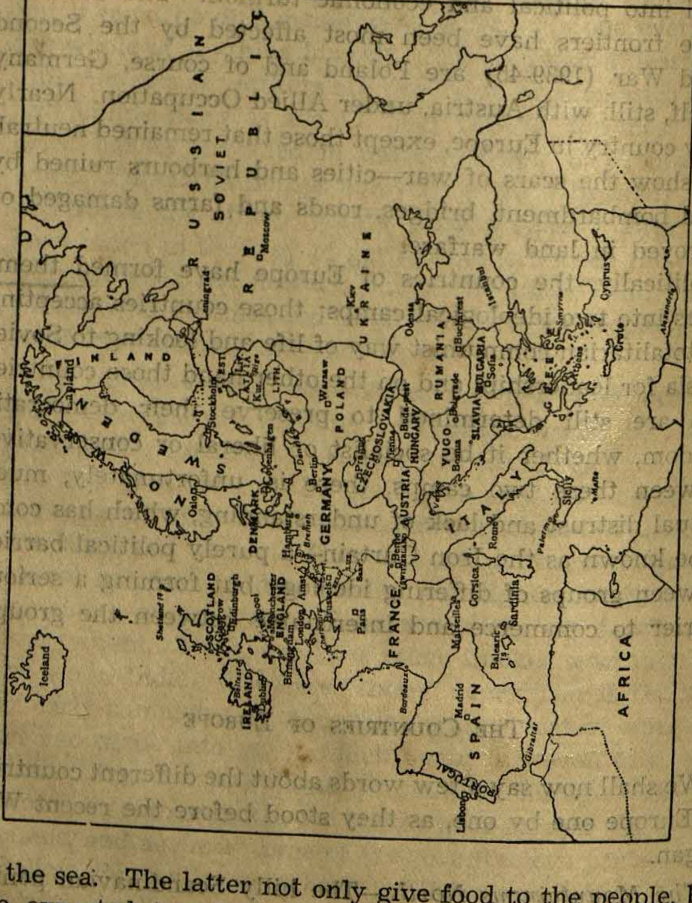

FIG. 206.—Europe (Political), as in 1938.

wood is also much used for making matches and—after it has been made into pulp—for paper. Timber and wood pulp are also exported. There are no navigable rivers, but the short rapid streams that rush down from the hills provide much water power, which is being more and more used to work machinery for making matches and paper. The people grow a little grain (chiefly rye and barley) wherever there is room, but they have to import some from the other countries. Coal and manufactured goods—especially woollen and iron—are the other imports. The chief trade is with Great Britain across the North Sea. Germany comes next. All the chief towns are on the coast. The capital is *Oslo. Bergen* is the chief fishing centre. *Trondheim* is another great port. The people have to work hard to get their living. They are for the most part strong and intelligent, ready to think and plan for themselves.

### (b) Sweden

Is in many ways like Norway, but it has more lowland, and therefore more crops can be grown. Iron is found in the north, but as there is not much coal in the country, it is more profitable to export the iron than to manufacture it. The trade of Sweden is like that of Norway except that iron ore takes the place of fish in the list of exports, and butter from the southern lowlands, where dairy farming is carried on, is also exported. Here Germany is the chief country traded with, across the Baltic, and the British Isles come second. The people are of the same race as the Norwegians. Both countries are governed by kings. *Stockholm* is the capital and *Gothenburg* the chief port.

## COUNTRIES OF THE PLAIN

### (a) Russia

*Russia* is even now very much the largest country in Europe. It takes up just about half the land of the whole continent. Before 1917 it was still larger; but a great revolution or change of Government then took place. The Czar, or Emperor, abdicated, and the country was made a *republic* called the "Union of Soviet Socialist Republic" (U.S.S.R.). All lands, forests, minerals, livestock, factories, mines, railways, etc., belong to the State. The State is ruled by a council, or Soviet, elected by the people at the head of which is the President. The Soviet makes law and rules according to which everybody must work the land or work in factories. One result of the revolution was the cutting off of the western part of Russia to form separate independent States. Large as Russia in Europe is, it is not so large as Russia in Asia, which is under the same government. Practically the whole of Russia is a great plain, broken only by a few ranges of low hills. The people who belong to the Slav race, were formerly mainly farmers. They are scattered in villages over the country, the average population being only about 72 to the square mile. These are mostly gathered in the fertile southern part. The cold north is almost entirely covered with pine forests, and few people live there. Almost the whole of Russia is covered with ice and snow in the winter months, and people travel in sledges, a kind of carriage with flat runners instead of wheels.

Wheat from the south, timber from the forests of the north, and petroleum, from near the shores of the Black and Caspian Seas, are the chief exports. Machinery and metal goods, coal and woollen goods are among the chief imports. It is a great disadvantage to Russian trade that her northern ports on the White Sea and the Baltic get frozen in winter, while her southern ports are on the Black Sea, from which the only way out is the narrow strait commanded by Turkey. The old capital was St. Petersburg or Petrograd, after the great Czar Peter who founded it; but it is now called *Leningrad* after one of the leaders of the Revolution of 1917.

*Moscow* in the centre of the country is the present capital. It is also a great railway centre. *Odessa* is the chief port on the Black Sea, exporting wheat. Since the establishment of the Soviet form of government, Russia has become one of the great industrial countries of the world, with huge new factories and many large towns amongst which are Kiev, Kharkov, Stalingrad, Magnesogorsk (a new iron town in the Urals) and Dnepropetrovsk.

### (b) Finland

It is the largest of the States separated from Russia on the west since 1917. (The others to the south of it are *Estonia*, *Latvia* and *Lithuania*.) It belongs almost entirely to the Tundra and Pine Forest belts. It is very cold and thinly populated. In the south are a great many shallow lakes. In the southern part and wherever the forest has been cleared, rye, oats and barley are grown. *Helsingfors* on the Gulf of Finland is the capital.

### (c) Poland

The northern part is a flat plain where cultivation of rye, oats and sugar-beet is carried on. The south is hilly. In this part there are some minerals—coal, petroleum (near Lemberg) and rock-salt. There are some wonderful salt mines in Poland that have been dug out into great caves, pillars of the salt being left to hold up the roof. The eastern part of the country is the river-basin. The western part is the basin of the Vistula, and you will see that a narrow strip of land on either bank of this river belongs to Poland running right to the sea, near where the great port of Danzig stands. This was arranged when the new boundaries of

Poland were settled after 1918, in order to give her an ope ing to the sea; but it was an awkward arrangement, as it c a little bit of Eastern Germany right off from the rest. Th Germans complained much about this, and so the grea town and port of Danzig was not counted as belonging t either Poland or Germany, but as a separate State unde the League of Nations.

Till 1939 Poland was a Republic under a president electe by the people, with *Warsaw* as the capital.

## (d) Germany

Though now smaller than before the last war this is still one of the largest and most important countries of Europe. It may be divided into two parts, the European plain in the north and the hilly districts of the south. In the north agriculture is largely carried on, rye, oats and potatoes on the rather poor soil round the Baltic, and a great deal of sugar-beet further south, where the soil is more fertile. The Rhine valley forms a division by itself. You will see that for some way the river flows between two ranges of hills, the Vosges on the French and the Black Forest Mountains on the German side. Between these ranges is a "rift" valley. It is sheltered by the hills and well-watered by the river, so that vines and tobacco—and wheat where the land is flat enough—can be grown. The vines are grown on terraces all up the hillsides, somewhat as tea is grown in tropical countries. In the south many forests still remain and minerals are found: coal, iron, zinc, lead and copper. Germany was, next to Great Britain, the greatest manufacturing country in Europe. Her trade was three-quarters that of Great Britain.

Her chief exports are chemicals, iron and steel goods and machinery, cotton goods, and sugar (from beetroot).

Chemicals are made from certain mineral substances and are useful in all sorts of ways. To take photographs you need certain kinds of chemicals, others are largely used in dyeing materials in different colours, and others again in making arms and ammunition. In fact they are needed in some form for almost every manufacture. *Stassfurt* in the Ruhr valley is one of the chief centres for making chemicals, *Essen* and *Dortmund* in the same district for iron and steel manufacture, *Chemnitz* further east for cotton manufactures. Woollen goods are made at *Aachen* on the Rhine. The chief imports are grain, cotton, wool, timber and coal. There is only a short sea coast, and not many ports. *Hamburg* on the Elbe is the most important, the next are *Stettin* and *Bremen* on the Baltic. *Cologne* on the Rhine is a great river port, the "head of navigation". Ocean steamers can come up to it. Till her defeat in 1945 Germany was a Republic, consisting of a number of States. Prussia was much the largest and most important. Its capital, *Berlin,* was also the capital of the whole country. Then there is Bavaria in the south, with its capital, *Munich,* and Saxony in the east—capital *Dresden.*

### (e) Denmark

On the north of Germany a narrow peninsula just out almost closing the entrance to the Baltic Sea. The southern part belongs to Germany, but the northern part, together with a number of islands, forms the Kingdom of Denmark. It is a low, flat country, better for pasture than for agriculture, and dairy and poultry-farming are, with fishing, the most important industries. Large quantities of butter and a great many eggs are exported, especially to Great Britain just across the sea. *Esbjerg* on the west coast is the chief port for this trade. *Copenhagen* on the east is the capital.

### (f) Holland and Belgium

These two little countries have often been counted as one, under the same Government; but for the last hundred years they have formed separate kingdoms. There is at present a Queen of Holland and a King of Belgium. Holland is entirely lowland, while there are some hills in the south of Belgium. Along the north of this higher ground coal is found, and so Belgium is a manufacturing as well as an agricultural country, while Holland is almost entirely agricultural and pastoral. A great deal of dairy farming is carried on in Holland, as in Denmark, and flower-growing is an important industry. Certain flowers are largely cultivated in Holland. The spring is the time when they chiefly come out, and then, in certain parts of Holland, you can see large fields full of flowers of the most brilliant colours. In Belgium grain and sugar-beet are chiefly grown.

If you look carefully at the physical map in your atlas, you will see that parts of Holland near the coast are coloured a dark green. This shows that they are actually below sea-level, and great "bunds" are built to keep out the sea. In Holland they are called dykes. We know here what a great flood will sometimes take place because a hole is made in such a bund. In Holland it would be much worse, because it is not only the waters of a tank or lake that would overflow the land, but of the whole vast ocean. So the Dutch—as the people who live in Holland are called—have to be very careful to keep these dykes in repair. Two or three times in the course of their history, when they were at war, they have on purpose cut the dykes and let in the sea to drive out their invading enemies. Afterwards they have of course had to build them up again. A great deal of Holland consists of the delta of the Rhine. Near its mouth is the great port of *Rotterdam*. Through it a very great deal of trade passes, not only for Holland itself but to and from the higher parts of the Rhine valley. Butter and cheese are the chief exports of Holland itself, besides the flower bulbs spoken of above. In return she imports manufactured goods of all kinds. *The Hague* is the capital and seat of government.

Belgium is not so well situated for trade as Holland, as the coast is mostly flat and sandy. There is however one great port—*Antwerp*. Trade is chiefly carried on by sea with the British Isles and United States, and by land with Germany. Iron and steel goods, woollen goods, flax and sugar are the chief exports. Grain, iron goods and cotton are the chief Imports.

*Brussels* is the capital; the other chief towns of Belgium are the manufacturing towns of the south, *Liége* for iron goods and *Namur* may be mentioned. See on the map that Belgium just fits into a corner between France and Germany nd the easiest way from one of these great countries to the ther lies across Belgium. Thus it has happened again and gain that when France and Germany have been at war, they ave led their armies across Belgium, and fought their attles there. Many famous battlefields are found in elgium, the most famous being that of Waterloo, just utside Brussels.

## (g) France

The north and west of France belong to the northern plain, e southern part is hilly. The hilly part may again be ivided into two, the central highlands and the high moun- ins, the Pyrenees and the Alps. France has an excellent imate—the very best part of the Maritime belt—plenty of vers and fertile soil, and it is one of the most important gricultural countries in Europe. It is one of the greatest heat growing countries in the world; but it cannot spare y of this for export, as the people need it all for their wn food.

The wheat is grown on the western and northern plain. Sugar-beet and flax are other important crops. The south coast belongs to the Mediterranean region, and all the chief Mediterranean fruits are grown there. Mulberries, for feeding silkworms, are very important in the Rhone valley. Vines grow not only in the Mediterranean region, but further north in all the sheltered river valleys of the centre and east—Garonne, Marne, Moselle—and France is the greatest wine-producing country of the world. In the north-west the climate is cool and damp, and here, apples are grown. France is well supplied with coal and iron. There is a half circle of small coal-fields round the central tableland, and larger ones in the north-east. In the north-east too (in Lorraine), plenty of iron ore is found. But France is not so rich in coal as Great Britain or Germany and is not so great a manufacturing country as either. For many of her manufactures water power from the mountain streams is used. *Lyons* in the Rhone valley is the centre of the silk manufacture. *St. Etienne* is famous for iron goods, especially motor cars, *Lille* in the north-east for iron and woollen goods, *Rouen* on the Seine for cotton. *Paris* is the capital and seat of a republican government, and many different routes lead to it. France has coast on three sides, north, west and south. On the north, *Cherbourg* is an important port of call for ocean liners but *Calais, Boulogne* and other towns are what are called "packet stations." They are almost like ferries from which steamers constantly go backwards and forwards to England; but there is no distant ocean trade. The distant trade is from *Havre, Rouen* and *Dunkirk*. On the west, *Nantes*, at the mouth of the Loire, and *Bordeaux*, the great wine port, are the most important, and in the short strip of south coast, *Marseilles*, from which ships go to other Mediterranean ports and to the east; also to America.

Although France is smaller than Burma, and has a ller population than either Bengal or Madras, the foreign le of France is more than two and a half times that of whole of India and Burma. France was one of India's t customers in Europe, and bought most of the ground- s and sesamum. India received in exchange from nce more goods than from any other country except eat Britain and the United States.

## MEDITERRANEAN LANDS

### (a) Spain and Portugal

These form the Iberian Peninsula. The centre of the ninsula is a tableland. It has a dry continental climate, hile the coastal plains have a Mediterranean climate with inter rain. Thus Portugal, which faces the west wind and s a large proportion of lowland, is more fertile and more ickly populated than Spain, though smaller in extent. In e Mediterranean parts of the country the usual fruits are rown. *Seville*, in the south of Spain, is famous for oranges, *Malaga* for raisins (really dried grapes). Much wine is ade, especially in the valley of the Douro in Portugal and ound Jerez in southern Spain. The cork oak grows in Portugal and in northern Spain. The dry uplands of the entre are not of much use for cultivation, but grass grows here, and a special breed of sheep with very long, soft wool, alled "Andalusian" are bred. The rocks of the tableland nd of the Sierra Nevada in the south are rich in minerals. Copper, lead, silver, quicksilver are all found in southern Spain, and much iron in the north and, as in Sweden, large quantities are exported. There is much coal in the north of Spain. Wolfram is found in Portugal.

Portugal and Spain are now both republics. *Lisbon*, the capital of Portugal, is a port at the mouth of the Tagus.

*Oporto* is another port. The capital of Spain is *Madrid*. It is in rather a curious position, right in the middle of the tableland, far away from the sea or from any navigable river in a rather barren part of the country. It has however the advantage of being very central. *Barcelona* is the chief port on the east, towards the Mediterranean. *Cadiz* in the south, with a very good harbour, faces the Atlantic. *Sevill* is a river port, the head of navigation on the Guadalquivir.

Wine and cork are the chief exports of Portugal, the same together with iron ore and oranges, of Spain. Both countries receive wheat, coal and manufactured goods in exchange. At the southern point of Spain, where Europe approaches Africa, the great Rock of Gibraltar juts out into the sea. For the last two hundred years this has belonged to Great Britain. Though it is nothing but a great mass of rock, it is very important because it commands the Strait of Gibraltar, which is the entrance to the Mediterranean. This means that the great guns of the fort on the rock would be able to keep enemy ships from passing in and out if there should be a war, and also to keep the passage safe for English ships. This control of the Straits is valuable because it is the first stage on the sea route to India.

### (b) Italy

Italy occupies a very central position on the Mediterranean and, including the big island of Sicily in the south, reaches across almost to Africa. It has a Mediterranean climate and the usual fruits are grown: olives, vines, mulberries, and in Sicily, oranges and lemons are specially important. The chief grain growing district is the valley of the Po, where much rice is grown. Wheat is grown in the rest of Italy. The people make the wheat flour into macaroni, which you may have seen in the bazaar. There is not enough however to feed the people, and more grain has to be imported. Sulphur from the volcanic regions is a noteworthy product. There are few minerals in Italy. One of importance is marble, a very smooth white stone, much used for ornamenting buildings, which is found at Carrara. In spite of the lack of coal, both silk and wool are woven in the north, the former at *Milan*, the latter at *Turin;* water power, which the streams from the mountains provide, is used to work the machines. These two towns are also important railway centres. Italy has several great ports, *Genoa* on the west and *Venice* and *Trieste* on the east. *Venice* is a very strange town, built on a great number of sandy islands on the shores of the Adriatic. The arms of the sea, called canals, which pass between these islands, serve as streets, and the people go about in boats called "gondolas".

For the last fifty years or so Italy has been a single country, ruled by a king. The capital is *Rome*, a city between two and three thousand years old. It is the first great historical city in the world, Delhi being the second. It was once the centre of the great Roman Empire that ruled all the lands round the Mediterranean, whether in Europe, Africa or Asia, together with western Europe as far north as Great Britain. The largest town in Italy is *Naples*, standing on a very beautiful bay. Close to this town is the great volcano of Vesuvius, from which flames and smoke are always rising. A terrible eruption completely buried two towns close to where Naples now stands. One of these, Pompeii, has been more or less dug out from the ashes and lava that covered it, and we can now see the streets, shops and houses, and how the people lived all those centuries ago. There is another volcano in Sicily, Mount Etna, which is also constantly in eruption. Some twenty years ago there was a very terrible one. Great rivers of red hot lava ran down the mountain side, burying village after village and destroying hundreds and thousands of fruits trees. In spite of this the people have come back and built new villages almost in the same places.

The railways of Italy are controlled by the mountain chains. Study your atlas and see how they converge on the plain of the Po, and how few railway cross the Apennines. In the south *Brindisi* was previously used as a port of call for mail steamers from the East. But this service has been discontinued and the mails are landed at Marseilles in France. The leading exports of Italy are silk and silk goods, fruits (almonds, lemons), vegetables, rubber goods, and cotton goods. Italy imports foodstaffs, raw cotton, wool and metals. Sicily is famous for its fruit and silk.

### (c) The Balkan Peninsula

The chief States of the Balkan Peninsula are Yugoslavia. Bulgaria, Greece and Turkey. The whole peninsula is mountainous and rocky, with narrow coast plains. As in the Iberian Peninsula, these coast plains have a Mediterranean climate, while the highlands are drier and more continental. The basins of the Morava, Varda and Maritza are the most important and productive parts of the country. Here wheat and maize are grown. On the lower hill slopes of Yugoslavia there are plum trees. The plums are dried and exported as "prunes". Olives and grapes are the chief products of Greece. Some of the grapes are made into wine. Others are dried as "currants". This name is really taken from Corinth, a town of Greece. *Athens* is the capital of Greece. It contains very beautiful buildings, many hundreds of years old. It was once the chief centre of learning for all the Mediterranean lands. *Salonica,* the port at the mouth of the Varda, now belongs to Greece. The capital of Yugoslavia is *Belgrade* and it stands just at the entrance to the route to *Istambul* (Constantinople). *Sofia,* the capital of Bulgaria, is near the Shipka pass, by which the mountains can be crossed from west to east, giving communication with the lowlands round the Black Sea. Once the Turks ruled the whole Balkan Peninsula. Now they have no possessions in Europe except the town of Istambul (Constantinople) and a small district round it. The position of Istambul is important because it gives command of the Bosporus, the entrance to the Black Sea. The straits are so narrow that in the old days the people of Constantinople actually shut them up by a great chain. The chief exports of the peninsula are currants, tobacco and olive oil from Greece, prunes from Yugoslavia, and wheat and maize both from that country and Bulgaria. Greece has to import grain for food, and all the States import manufactured goods.

## CENTRAL EUROPE

### (a) Rumania

Rumania is essentially an agricultural country. It is now nearly as large as the Bombay Presidency and has as many people. Wheat and maize are grown. The mountainous part is rich in minerals, oil, coal and iron. Sheep, cattle and horses are also reared on the hill pastures. *Bucharest* is the capital and *Galatz* the river port on the Danube; *Constanta* on the Black Sea is free from ice all the year. These towns have developed industries connected with agriculture, flour milling, brewing, distilling and sugar-making. Its exports are wheat, maize, timber, petroleum and live-stock: its imports are cotton and woollen goods and machinery.

### (b) Czechoslovakia

This forms largely a mountainous country. It arose in 1918 as a result of the Great War. Formerly it was part of the Empire of Austria-Hungary. It is about the same size as Assam with double the population. Although it is difficult to govern a country so divided by nature into separate parts, the people here are united by strong national feeling and a desire to make their new country prosperous. It is noteworthy that Czechoslovakia is the most efficient of the new countries of Europe and a highly developed territory. Cotton mills, glass and chemical factories sprung up on the coalfields, whilst paper mills and saw mills are to be found near the forested mountains. Iron ore is to be found between *Prague*, the capital, and *Pilsen* and both these places have iron and steel works. Lead and zinc are found, and grain and sugar-beet are grown. Goods can be sent either up or down the Danube on the south, and northwards by the Elbe or the Oder.

### (c) Austria

Before the Great War of 1914—18 there was a big empire known as Austria-Hungary. Many peoples were included in the empire and some of them desired to be independent. And so, at the close of the war, the empire split up into a number of republics. It forms an almost all-mountainous country, too mountainous to grow sufficient food for its people. Just where the Danube leaves the mountains and enters the Hungarian plain lies *Vienna*. It is a large and flourishing city though not so flourishing as before. One-fourth of the people in the country live in Vienna. It occupies an important position as the meeting-place of main routes. Austria has little good coal, but water power can be developed. Timber and paper are her chief exports. Cotton and wool are manufactured by the aid of water power.

### (d) Hungary

In many respects, Hungary is the opposite of Austria. It is a little larger and has a few more people, but whereas Austria is mountainous, Hungary is almost entirely a plain.

As a result of the wall of mountains, Hungary is cut off from the moderating influence of the sea and has a continental climate of great extremes. The people of Hungary, known as Magyars, are essentially agriculturists. The natural vegetation of the plain is steppe land and there are few trees. But the natural grassland has disappeared. The soil in the north is poor and rye, oats and barley are the crops. But in the south wheat and maize are the main crops and the yield of good quality wheat is high. Sugar-beet is also grown. Many cattle are kept and fed upon fodder crops or corn, specially grown.

Most of the industries of Hungary are connected with agriculture—flour milling, sugar making, and distilling. Hungary has deposits of good coal but has little iron or other minerals. *Buda Pest,* the principal town, really consists of two towns, one on either side of the River Danube. It is an important railway junction, and the natural collecting centre of the plain. The Danube and its tributaries are also used for transport. *Szeged* is the largest town in the south of Hungary.

### (e) Switzerland

This little country consists of the Jura mountains in the north-west, the Alps in the south, and a high plateau between the two. The mountains are not as high as the Himalayas. The Mont Blanc, the highest peak, is not quite 16,000 feet high, but because the country is far away from the equator the peaks are covered with snow, and ice rivers or glaciers descend from them. The glacier-worn hollows have formed beautiful lakes—Geneva, Zurich and Constance. Switzerland is about two-thirds of the size of Ceylon. Although half the country is occupied by high mountains which cannot be used, the population is nearly as large as that of Ceylon. Most of the cultivated land is found in the plateau, and there most of the people live. The country is not naturally fertile, but the people have worked hard, and have used every inch which can be used. The mountains of the Alpine zone are very beautiful, and every year numbers of tourists visit Switzerland from all parts. They go both in winter for winter sports, and in summer for mountain climbing. The tourists bring considerable wealth to the country and support a large number of hotels in the country.

The most important occupation is dairy farming, and Switzerland is famous for its cheese and condensed (or tinned) milk. In the warm weather the cattle live on the grass on the mountain sides; in the cold weather, when the mountains are snow-covered, they are brought down to the valleys. The word "Alp" means a mountain pasture. Switzerland has no coal, but has developed its water power. Many of the railways have been electrified, and many of the factories are operated by electricity. Transport being expensive, Switzerland has specialised in the manufacture of small objects. Watches and clocks, for example, are made at *Neuchatel* and *Geneva*. Fine silk goods are made at *Zurich, Basle,* and *Berne,* the capital. Basle on the Rhine is an important route-town. Milk is tinned at *Vevey*. The Swiss trade is chiefly with Germany. The imports are raw materials (cotton, silk, and wool) as well as metals and foodstuffs (wheat, sugar, and vegetables). The exports are manufactured goods (fine cotton and silk goods, watches and clocks, and machinery), as well as cheese and tinned milk. Switzerland lies at the meeting point of many routes and Geneva was made the headquarters of the League of Nations.

This tiny republic consists of some thirty-two small divisions called cantons. There is no Swiss language a such and as the country lies between France, Germany an Italy, the languages of these three are spoken in differen cantons, French in the east and the north and Italian i the south.

**Communications.** — (*a*) *Sea.*—Europe has so broken a coast line that the communication is important. There are many ports all round the coast and a great deal of trade is carried on in this way. The Baltic Sea and the sea on the north of Russia are frozen in winter, so that the ports here are only useful for a part of the year.

(*b*) *Rivers.*—There are many navigable rivers in Europe, by which smaller boats can penetrate from the seaports far up into the country. All over the northern plain, in France, Belgium, Holland and Germany these rivers have been largely connected by canals. These canals are not made as in Burma and India for irrigation, as the rainfall is generally sufficient, but as means of communication. They are large enough for flat bottomed boats of considerable size, known as barges, to travel on them, and it is possible to pass by means of these canals from one river to another over very large tracts of country.

(*c*) *Railways.*—Europe has more miles of railway in proportion to its size than any other part of the world. You can see the country crossed by a regular network of them in the railway map. On the flat plains of the north it is easy to make them: but several lines go even across the Alps, connecting France and Germany with Italy. All have to cross high passes and to go through long tunnels or passages cut through the solid rock.

(*d*) *Airways.*—Aeroplane travel has become very popular in Europe. There are a number of routes over which aeroplanes go as regularly as trains on railways or ships on the ocean.

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate your answers with diagrams, sketches, etc.

1. In a map of Europe mark the places you know where people would carry on the following occupations:—fishing, farming, mining. Give reasons.

2. Describe the situation and account for the importance of the following:—Constantinople, Vienna, Geneva, Genoa, Moscow, Nijni

Novgorod, Marseilles, Paris, Gibraltar, Lyons, Essen, Hamburg, Basle, Madrid, Sofia, Leningrad. (B.U.)

3. Give geographical reasons for the following:—

(*a*) Hotel-keeping is an important business in Switzerland.
(*b*) Nations of Southern Europe are wine drinkers. (B.U. 1935)
(*c*) Switzerland is called the "Playground of Europe."
(*d*) Holland is a land of dairy farmers.
(*e*) The movement of the centres of European civilization is northwards.
(*f*) Europe is the peninsula of Asia.
(*g*) Rhine valley is important to Switzerland.
(*h*) Greece is an agricultural country.
(*i*) Czechoslovakia is a difficult country to govern.
(*j*) Belgium is typically a buffer State.
(*k*) The Dutch are sturdy and persevering.
(*l*) More than half the exports of Denmark go to Great Britain.
(*m*) The Norwegians have a large fleet of merchant vessels.
(*n*) Europe has become the most important of all the continents.
(*o*) Ireland is called "Emerald Isle'.

4. Insular, Continental and Mediterranean climates are all represented in Europe. Where? And what is the difference between them?

5. Account for the following specialised products:—

(*a*) Swiss watches.
(*b*) Swedish matches.
(*c*) French wine. (B. U. 1926, 27 & 35)

6. Describe the chief characteristics of European rivers. (B. U. 1919)

or

Compare the Rhine and the Danube

or

What countries lie in the basin of the Danube? Explain its importance to Hungary. (B. U. 1923)

or

What is meant by an international river? What rivers of Europe are international, and why?

7. Give an account of the physical features, climate, natural products, occupations and industries of any one of the following countries:—

1. Germany.
4. Spain.
7. France.
2. Italy.
5. Holland.
8. Denmark.
3. Czechoslovakia.
6. Belgium.
9. Ireland.

(B. U.)

8. Explain how geographical conditions affect the life and occupations of the following peoples:—

1. The Swiss. (B. U. 1926)
2. The Norwegians.
3. The Danes. (B. U. 1927)

9. What are the different states that have been created from Austria-Hungary as a result of the Great War? Give a short account of the people, the government and the leading towns in any one of the newly created states. (B. U. 1929)

10. Compare and contrast Scandinavia and Italy.

## CHAPTER XXVII

## THE BRITISH ISLES

The British Isles consist of a number of small islands and two large islands (Great Britain and Ireland) lying in the north-west corner of Europe. The south-east coast of Great Britain is separated from the mainland of Europe by the Straits of Dover. The island of Great Britain consists of the three countries: Scotland in the north, Wales in the west and England occupying the remainder. England, Scotland and Wales have been joined under one king since 1603. Since 1920 Ireland has been divided into "Northern Ireland" and the "Irish Free State." Northern Ireland has a parliament of its own, but is very closely linked with Great Britain. The Irish Free State has "Dominion Status" and is as independent of Great Britain as Canada or Australia, forming one of the members of the British Commonwealth.

"United Kingdom" now means the United Kingdom of Great Britain and Northern Ireland.

**Position and Size.**—Two lines of longitude (0° and 10° west) and two lines of latitude (50° and 60°) make a rectangle. Notice that the British Isles lie almost entirely inside this rectangle. They are roughly of the same size as the Bombay Presidency. Great Britain is larger than Bengal but smaller than the Punjab, and has roughly the same number of people as Bengal or the United Provinces.

## PHYSICAL FEATURES

The seas surrounding the British Isles are shallow, and there is an extensive continental shelf. The Isles have a very long coast-line, so that no part of the country is very far from the sea. There is no place in the British Isles which is 100 miles from the sea, and there are very few people who have never seen the sea. The western coast of Scotland is a fiord coast with many islands (the Inner and Outer Hebrides), and the openings on other parts of the coast are river mouths. To the north lie the Orkney and Shetland Islands; to the south is the Isle of Wight; and between Great Britain and Ireland is the Isle of Man.

The seas—especially the shallow seas on the east, are full of fish; so the British soon learnt to be fishermen.

There are no high mountains, the highest being Ben Nevis, in Scotland, about 4,400 feet. In general the mountains are in the north and west.

**Build.**—Look at Fig. 207.

(*a*) You will see that northern Scotland is mountainous. It is in fact a little block, chipped off, as it were, from the mountain ranges of Scandinavia to the east. The mountains are rough and rugged, and make both travelling and cultivation difficult.

(*b*) Next comes a long narrow valley, across the whole width of Scotland, from east to west.

(*c*) The southern mountains (much lower than the northern ones) fill southern Scotland with small ranges, stretching out into England.

(*d*) The northern part of England is hilly.

(*e*) The little country of Wales on the west is almost as hilly as the Highlands of Scotland, but the hills are not so high. Snowdon, the highest, is less than 4,000 feet.

(*f*) Most of the south of England is lowland. Some hill and ridges there are but they have smooth grassy tops, and are called not *"ups"* but *Downs.* The important ones are the *North* and *South Downs.*

(*g*) In the north of *Ireland* there are again mountains —some on the west.

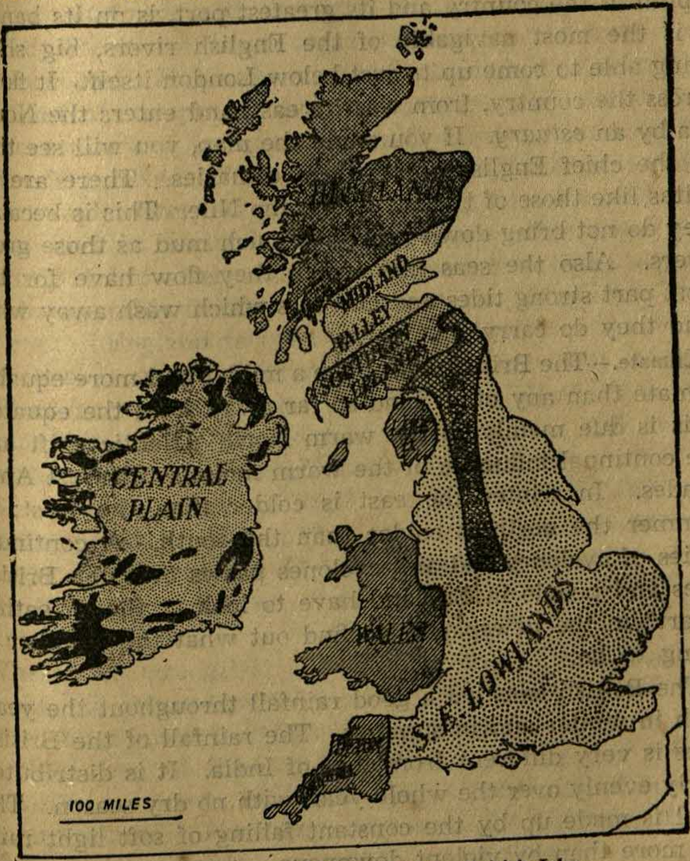

FIG. 207.—Physical Divisions of the British Isles.

(*h*) The greater part of Central Ireland is lowland, some of it very wet and boggy.

(*i*) The south is hilly.

**Rivers.**—Naturally we shall not expect to find any rivers in the British Isles as large as the Rhine or the Danube, and certainly none like the Irrawaddy or the Ganges. The *Thames* is the most important river, because London, the capital of the country and its greatest port, is on its banks. It is the most navigable of the English rivers, big ships being able to come up to just below London itself. It flows across the country, from west to east, and enters the North Sea by an *estuary*. If you study the map, you will see that all the chief English rivers form estuaries. There are no deltas like those of the Indus and the Nile. This is because they do not bring down nearly so much mud as those great rivers. Also the seas into which they flow have for the most part strong tides and currents which wash away what mud they do carry.

**Climate.**—The British Isles have a milder and more equable climate than any other land so far away from the equator. This is due mainly to the warm North Atlantic drift and the continual influence of the warm moist south-west Anti-Trades. In winter the east is colder than the west; in summer the north is colder than the south. A continual series of cyclones and anti-cyclones passes over the British Isles and people in England have to look at the "Weather Chart" in the newspapers to find out what the weather is going to be.

The British Isles get a good rainfall throughout the year, both in winter and in summer. The rainfall of the British Isles is very different from that of India. It is distributed fairly evenly over the whole year, with no dry season. The total is made up by the constant falling of soft light rain, far more than by violent downpour.

**Vegetation and Agriculture.**—The natural vegetation is broad-leaved deciduous forest, the trees losing their leaves in the cold season. Oaks, beeches, elms, and chestnuts are the chief kinds. Coniferous forests are found on the hills. But the land is so densely populated that very little natural vegetation is left. The Highlands of Scotland and the mountains of Wales are covered with "moorland" in which the principal plant is a small bush, about a foot high, called heather. It forms a thick carpet all over the ground. In Ireland, there are large areas of moorland and in the lowlands, bogs. England is essentially an industrial country, and most of the people live in the towns; the remainder of the country is occupied by small farms. The English farmer is a mixed farmer; there are no stretches of untidy waste jungle; everything looks neat and tidy, because the farmer divides his lands into small fields. The crops are carefully looked after, and the yield per acre is often higher than in any other country of the world. In Ireland and the wet west of England dairy farming is important; in the drier east wheat is grown. Scotland is too cold for wheat, and so oats and barley are grown. But good and cheap wheat is obtained from the wheat-lands of the world, and more important often are vegetables and fruit.

The shallow continental shelf round the British Isles is a breeding-place for fish. All round the coast are fishing villages, and a great variety of fish is eaten by the people of Britain. Most famous of all are the Herring Fisheries of the North Sea.

Where *oats* are grown, the people eat a great deal of oatcake and oatmeal porridge made from them. In Ireland, where the climate is rather damp for grain, *potatoes* are the chief food of the people. *Turnips, beans* and other vegetables are grown in England, and lately *sugar-beet* has been introduced. The rainy west is better for *grass* than for grain. Here cattle are reared, and much dairy work is carried on. The butter and cream of the west of England are famous. Some of the cattle are fine large fat beasts with long sharp horns, very different from the humped white cattle of India.

In the south-west and midlands there are many orchards of apples from which a drink called cider is made. Much fruit, such as cherries, plums and strawberries, is grown throughout the south of England. When the orchards are in flower, in April and May, the trees all covered with white and pink blossom, so thickly that the newly budding leaves are hidden, they are a very beautiful sight. *Hops*, the fruit of a creeper, are used in making *beer*.

The hills of Yorkshire and Wales and the Downs of southern England produce short soft grass which is very good for *sheep*. In old days England was a great wool-producing country, exporting wool to Holland and Belgium, where it was woven into cloth. Later the English learnt to weave their own wool, and now they need far more than can be obtained from English sheep, and import it from other countries, especially Australia.

**Minerals.**—The main minerals of England are chiefly two both useful, *coal* and *iron*.

In Scotland there are large and important coalfields in th central valley. There is a small coalfield in Cumberland in the north of England and a much larger one in Durha and Northumberland. To "send coals to Newcastle" (th chief town here) has come to be a proverb for giving something that is not in the least wanted, because there is plent of it already. Nearly a quarter of all the coal in the Britis Isles is obtained from the long coalfield which runs alon the eastern edge of the Pennine hills, through Yorkshir down to Derbyshire and Nottinghamshire. On the wes side is the Lancashire coalfield. A little further south dow on the plain, is a group of four coalfields, forming a roug square—the north and south Staffordshire, the Leicestershir and Warwickshire coalfields. There is a small coalfield i North Wales, and a much larger one in South Wale Some new beds of coal have been found in Kent, which a beginning to be worked. Otherwise there is no coal-minin carried on in the south of England. *Iron* is found in many parts. In old days a great deal was worked in Sussex and other places in the south. In those days however it was smelted with wood, cut from the forests that then covered most of the land. Now there is no longer wood to spare and the iron ore is smelted with coal. Iron ore is obtained in Yorkshire, the Midlands, on the South Staffordshire coalfield and in Cumberland. The other minerals of the British Isles are not important. Long ago the tin mines here were famous, and some long voyages in history were

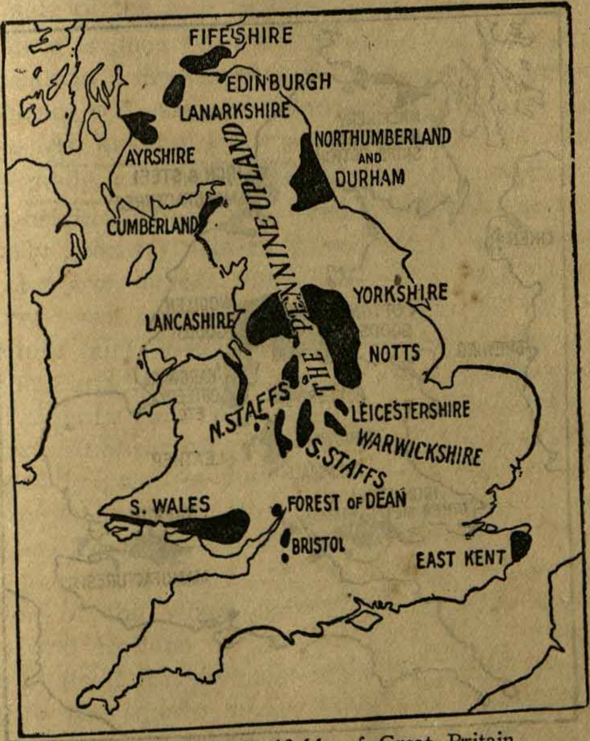

FIG. 208.—The Coalfields of Great Britain.

taken by the Phœnicians from Asia Minor, to obtain their tin, but it is not important now.

**Manufactures.**—Where coal and iron are found near one another, manufacturing industries spring up, because—

(1) the machinery is made chiefly of iron, and

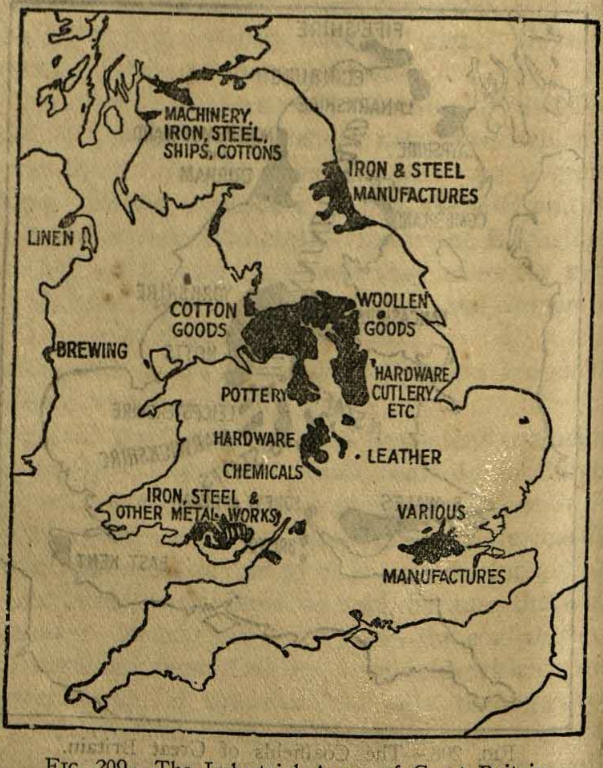

FIG. 209.—The Industrial Areas of Great Britain.

(2) the coal is used both for smelting the iron and for driving the machines. Fig. 209 is a map showing the chief "Industrial" or Manufacturing areas. Compare it with that of the coalfields (Fig. 208) and see how much alike they are.

Modern ships are made of iron and steel, so it is easiest to build them where coal and iron are found. The *Clyde Estuary, Newcastle* and *Barrow in Furness* in Lancashire are great *ship-building* centres. *Woollen goods* are made in *Yorkshire,* where in old times it was easy to get wool from the moorland sheep. *Cotton* is woven instead of wool on the western side of the hills in Lancashire, because the damp climate here is good for the delicate cotton fibres, which would break in a dry atmosphere, also because raw cotton from America can easily be brought direct to Liverpool on the coast. All kinds of *cutlery,* such as knives and scissors, are also made on the Yorkshire coalfield, especially at Sheffield, originally because the stone of the hills nearby was particularly good for making grindstones to sharpen them. Many other *iron gooods,* hardware, pots and pans etc., also motor cars and bicycles, are made on the South Staffordshire and Warwickshire coafields, especially at Birmingham and Coventry. In North Staffordshire *pottery* is the chief manufacture. As in the case of the Yorkshire wool, it was first established there because the clay of the district was especially good for the purpose. Special "china clay" is also brought from the south of England, from Cornwall.

**People and Population.**—Great Britain is one of the most densely populated parts of the world. The average population of the whole British Isles comes next after Belgium and Holland on the European list. If we take England by itself, it is the mose densely populated of all (701 persons to the square mile). It is not the *agricultural* districts but the *manufacturing* districts that have the geatest populations. It is therefore a *town* and not a village population. Agriculturists live in villages, to be near their fields. But where manufactures are carried on people crowd together in great towns.

The people of Great Britain belong mainly to the *Nordic* race which occupies the rest of the north of Europe, Scandinavia, Germany etc. But as you will have learnt in your history, many different people have from time to time crossed over from the Continent. The first people we know of were the "Britons" from whom we get the name Britain. This race of people still forms the chief population of the Highlands of Scotland, Wales and Ireland, and are in many ways different from the English. The *Romans* came, but went away again. Then came *Saxons, Danes, Normans,* all different branches of the same Nordic race. It is now nine hundred years since the last conquest of England by William of Normandy, and all these different people have had time to settle down together and make one race, the British.

**Towns.**—*London,* one of the largest cities of the world, has been the capital of England almost ever since the Romans found here the first place at which they could conveniently cross the Thames. From the very first it has been the meeting place for important roads in England. Ships too sail up the Thames to the port of London, just below the main city, so it has always been a great place for trade. The mouth of the Thames is opposite the mouths of the Rhine, one of the most important rivers of Europe, and so London is well situated for trade with the countries of the Continent. For hundreds of years London has grown and goes on growing still. It pushes out reaching and drawing into itself village after village, town after town. After London, *Liverpool* is important, standing on the west coast at the mouth of Mersey. It is in a good position for trade with America on the opposite side of the Atlantic. It imports large quantities of raw cotton, and exports the cotton goods that has been made from it in the neighbourhood. Not only trading vessels, but passenger steamers go out from Liverpool all over the world especially to America and India. *Hull* on the Humber, on the opposite east coast, trades more with the countries round the Baltic, with Germany and with Holland. A great deal of dairy produce is imported here. *Grimsby* close by is one of the great centres of the *fishing* industry of the North Sea.

In the south, *Bristol* used to be the greatest English port after London, and still does a great deal of trade. *Southampton*, with the Isle of Wight standing before it as a breakwater, to keep off the winds and waves, is a great centre of passenger traffic to Africa, Australia and America. *Portsmouth* is the chief naval station of the country. *Manchester* close to Liverpool, the centre of the cotton industry, *Leeds* and *Bradford* in Yorkshire, where woollen goods are made; *Sheffield*, in Yorkshire too, famous all over the world for its steel goods and, in the Midlands, *Birmingham*, where all sorts of metal goods are made; *Coventry* famous for motor cars; *Stafford*, the centre of a great pottery and china manufacture. *Oxford* and *Cambridge* are the seats of the two oldest, and still the most important Universities in England.

*Cardiff* is the biggest town in *Wales*, a large mining centre exporting a great deal of coal. Of Scotland *Edinburgh* is the capital. *Glasgow* on the Clyde is a great port and centre of the ship-building industry. *Aberdeen* in the north is a fishing port.

Of Ireland, *Dublin* is the capital of the Irish Free State and the seat of Government. *Belfast* in the north is the chief manufacturing town. Its linen is famous everywhere. It is also the seat of government of Ulster or Northern Ireland.

**Communications.** —External communication with the British Isles is of course carried on by steamer and is very important. There is a magnificent series of railways which radiate from London. Nearly all the lines are double lines, and large numbers of trains run daily. England has some of the fastest trains in the world, with an average speed of sixty miles an hour. The fastest Indian trains do not average more than thirty-five or forty miles an hour. Great Britain is only one-twentieth the size of India, but has 20,000 miles of railway—more than all the broad-gauge railways of India.

**Trade.**—Great Britain is one of the most important trading countries of the world. She, being a "making" country with a very large population for its size, requires to import large quantities of foodstuffs (e.g. rice from Burma, wheat from Canada and South America, meat from South America, New Zealand etc.) and raw material for manufactures, especially wool and cotton. She obtains these from all parts of the world, and sends out in return her woven goods, her iron and steel goods and her coal. Fig. 210 is a diagram comparing the exports of the British Isles and of India. Notice the different proportion of agricultural and of manufactured goods.

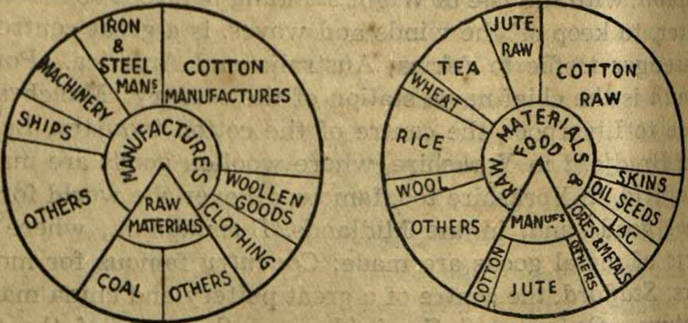

FIG. 210.—The exports of England and India.

**The British Empire.**—The British Empire, better called the British Commonwealth of Nations, is the largest Empire the world has ever known. It covers more than one-fifth of the whole of the land surface of the globe and has more than one-quarter of the world's people.

The Commonwealth consists of:—

(*a*) Great Britain and Northern Ireland.

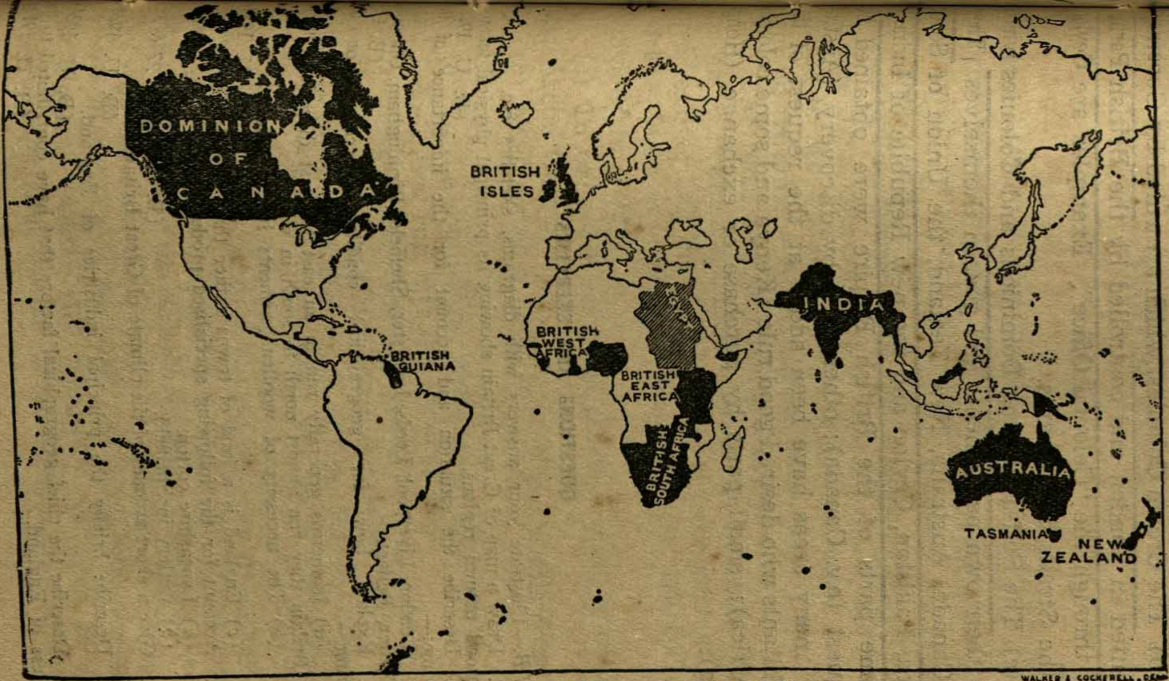

FIG. 211.—The British Commonwealth of Nations.

*Note*—The area marked INDIA now also includes Pakistan and the Island of Ceylon. Eire, Burma and Egypt are now independent countries outside the Commonwealth. British South Africa is now the Union of South Africa. The Sudan is ruled jointly by Egypt and Britain and is known as the Anglo-Egyptian Sudan.

(b) The Crown Colonies, which are ruled by Governors appointed in London and controlled by the British Parliament through the "Colonial Office". Examples are Ceylon and the Straits Settlements.

(c) The Self-governing Dominions and Colonies which have their own parliaments and govern themselves. They are Canada, Australia, New Zealand, the Union of South Africa, Pakistan, Ceylon and the new Republic of India.

Some parts of the British Empire were obtained by conquest (e.g. Canada); other parts by discovery (Australia); many areas have been added at the request of the inhabitants who desired good rule (Kenya and some colonies in Africa); small parts by purchase or exchange (Hong-Kong).

## QUESTIONS AND EXERCISES

*N.B.*—Illustrate your answers with diagrams, sketches etc.

1. Draw a map of Great Britain showing its principal physical feature and broad natural regions. (B. U. 1923

2. Describe the situation and account for the importance of th following:—

London, Liverpool, Leeds, Leicester, Sheffield, Birmingham, Glasgo Manchester, Belfast. (B. U

3. Explain how far geographical conditions account for th following:—

(*a*) Isotherms generally run in an east to west direction, but i Great Britain they run almost north to south in winter.

(*b*) The necessity of woollen garments in England. (B. U. 1930

(*c*) England is a land of towns rather than of villages.

4. Account for the following specialised products:

(*a*) Lancashire cotton.

(*b*) Cutlery in Sheffield. (B. U. 1926 & 27 & 35

5. Give a short account of the climate of Great Britain. (B. U. 1923

6. Describe briefly the principal industries of England. (B. U. 1924

7. Describe the chief geographical factors that have contributed to th greatness of England. (B. U. 1919

# CHAPTER XXVIII

## ASIA

**Position.**—Asia is the largest of the continents and comprises one-third land of the globe. There is no very clear division between it and Europe. The two together are often spoken of as *Eurasia.* It is also joined to Africa by the Isthmus of Suez between the Red and Mediterranean Seas; but here the connecting strip of land is narrow, and the two continents are distinct. The northern parts of Asia run right up within the Arctic Circle, quite near to the North Pole. The most southern point, Singapore, at the end of the Malay Peninsula, almost touches the Equator. Thus it stretches over half the globe measuring from north to south.

**Build.**—Look at a physical map of Asia. We shall find it divided into *three.*

(*a*) To the north are great plains, sloping towards the cold Arctic Ocean.

(*b*) Next comes a great belt of mountains from west to east.

(*c*) To the south three great peninsulas, Arabia, India and Indo-China, run into the Indian Ocean.

*Mountains.*—First study the mountain belt closely, since mountain ranges are often like a backbone.

In the far west at the centre of Asia Minor, between the Black and Mediterranean Seas, we find a hilly tableland, with ranges of higher hills—the *Taurus* and *Anti-Taurus.* Due east of the Black Sea, running straight across like a bar between it and the Caspian Sea is a high range, the *Caucasus* which here forms the boundary between Asia and Europe. Towards the east, there is another plateau in Persia. The *Elburz Mountains,* at the south end of the Caspian Sea, are the highest. Passing still eastward, we come to a great mass of high land, known as the *Pamirs,* sometimes called the "roof of the world" from its height. On the west we have the *Hindu Kush,* on the south a rather longer one but not so high, the *Suleiman Mountains,* while towards the east we have a number of very long and very high ranges—the *Himalayas,* which form the northern boundary of India, the

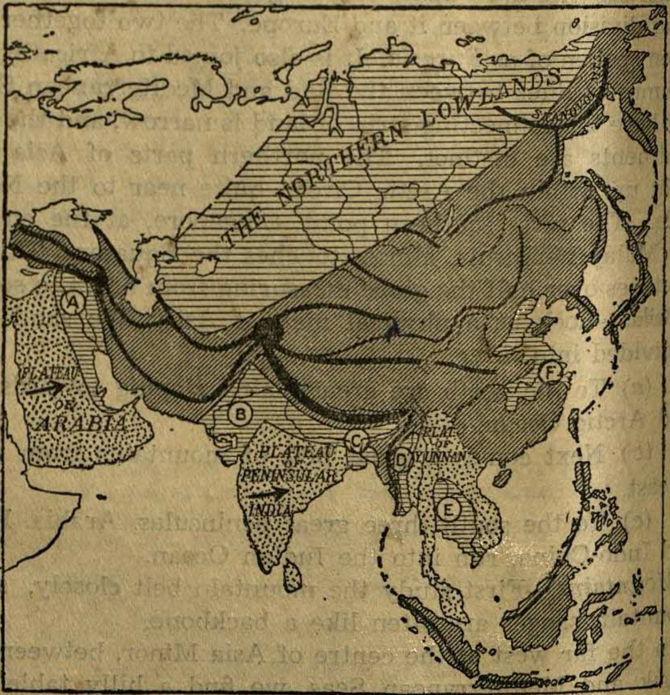

FIG. 212.—Physical Features.

*Karakoram,* the *Kuen Lun,* the *Thian Shan* mountains. Between the Himalayas and the Kuen Lun stretches the very high plateau of Tibet, the whole over 12,000 ft. high. North-east of the Thian Shan mountains is another range, the *Altai* mountains, north of which the land sinks to the plain. Taking a turn to the north, the *Yablonoi* and *Stanovoi* mountains carry on the line of high land right into the far north-east corner. In the same way, the *Khingan Mountains* near the Chinese coast are the last continuation of the line of mountains that start with the Kuen Lun. To the south run the three peninsulas. The whole of central Arabia is a tableland. We have already noted the Ghats in India, and the western and eastern Yomas that run through Burma, the latter being continued right down the narrow Malay Peninsula to Singapore. Then there are the *Ural Mountains*, which seem to start up unconnected with anything else in the middle of the northern plain and form the boundary between Europe and Asia.

### RIVERS

With such a huge mountain mass in the middle of the continent we should expect it to prove the main water-shed, and in fact rivers do flow out from it in all directions. We can divide Asia—according to the oceans to which the rivers flow—into regions of *Arctic, Pacific, Indian Ocean* drainage, with one last area of *inland drainage* for those that do not reach the ocean at all.

(*a*) *Arctic Drainage.*—Here we have three great rivers—the *Ob*, with its tributary the *Irish*, the *Yenisei*, and the *Lena*. These rivers, long as they are, are not navigable. The sea into which they flow is frozen for nine months of the year, so there can be no useful ports at their mouths, even if it were not too cold for people to live there. Further, when after rain or the melting of the snow, the upper part of the river is full the water that rushes down finds the lower course hard with ice which it cannot push away. There is nothing therefore that it can do but overflow the banks and spread in a swampy marsh—frozen—over the surrounding country. These rivers then are not of great importance.

(*b*) *Pacific Drainage.*—It is very different when we come to the rivers that flow towards the east into the

Pacific Ocean. There are four of them from north to south, the *Amur*, the *Hwang-ho*, the *Yangtse-kiang*, and the *Si-kiang*.

The Amur forms the boundary between Siberia and China for some way, and finally flows into the Sea of Okhotsk through Russian territory. Its valley is the centre of a small agricultural population. The Hwang-ho and the Yangtse-kiang both rise in the tableland of Tibet. At one point they are very close to each other, but, as one starts towards the north and one towards the south there is a long distance between their mouths. Both are long rivers and provide much water for the fields, and thus the lower valleys of both

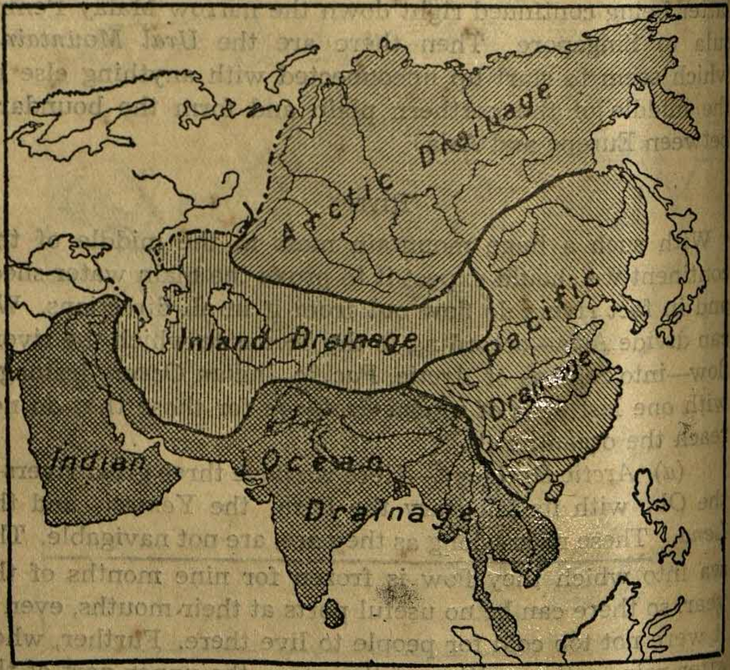

FIG. 213.—Drainage Areas of Asia.

are among the most densely populated regions of China. Of the two the Yangtse is far the more useful. The Hwang-ho, rushing violently through deeply cut gorges for half its course, is liable to great floods, which do much damage and make navigation impossible. It flows into the Gulf of Pechili. It used, however, until 1852, to run straight eastward and reach the Yellow Sea, just south instead of north of the rocky Shantung Peninsula. Then a great flood cut a new path to the sea which it still follows. It is this way of changing its course in time of flood, as well as the harm done by the inundation of its banks, that has given it the name of "China's Sorrow". The Yangtse, on the other hand, soon ends the mountainous parts of its course and flows on a broad, steady, navigable stream, through a great valley that runs across China from west to east, forming a great highway into the heart of the country. Large ocean steamers can go 700 miles up, to *Hankow*, and river steamers a good deal further, to *Ichang*, which is the "head of navigation". The last river the Si-kiang, or West River, is not nearly so long, rising no further off than the Yunnan Plateau; but it is very useful for trade. Its valley also provides a road into the interior, and a centre of population. The large town on *Canton* at its mouth, with the island of Hong-Kong (a British possession) just off the coast, makes it important.

(c) *Indian Ocean Drainage.*—Turning now to the south, we find a group of rivers flowing southwards instead of eastwards. The first is the *Mekong*, which cuts its way between the ranges of the Indo-China Peninsula, forms the boundary between French Indo-China and Siam for a considerable part of its course, and finally reaches the sea in Cochin-China. Its valley and delta support a considerable rice-growing population. Then come the *Salween* and the *Irrawaddy*, in Burma. Passing westward, we find the great

Indian rivers, *Brahmaputra, Ganges, Indus.* Next come two rivers which do not rise in the central mountain mass, but in the Anti-Taurus mountains of Asia Minor—the *Euphrates* and the *Tigris.* Side by side they flow southwards, never very far from each other, and join together to form a single stream, the Shat-el-Arab, just before flowing into the Persian Gulf. Their basin is marked by a narrow plain going by the name of *Mesopotamia* which means "the land between the rivers", and these rivers have for ages made it fertile. Long, long ago it was one of the first countries of the world to be civilized. In those days great towns were built of brick made from the clay of the valley, and irrigation carried the water of the rivers to all parts, making cultivation everywhere possible. In the last few hundred years, however, the irrigation works have fallen into disuse for lack of repairs, and much of the prosperity of the country has disappeared. Efforts are now being made to restore the old condition of things.

(*d*) *Inland Drainage.*—Then there are the Asiatic rivers, those that partly from the great size of the continent, partly through the arrangement of the mountains, never reach the sea at all, but flow into inland lakes. The most important are, the *Tarim* between the Thian Shan and Kuen Lun mountains, the *Amur Daria* and *Syr Daria,* both of which flow into a large salt lake, the *Sea of Aral.* The valleys of all three form oases of fertile land in practically a desert country. The *Jordan* rushes south from the Lebanon mountains to lose itself in the bitter waters of the *Dead Sea,* where no creature of any kind can live.

Besides the lakes just mentioned, there is the *Caspian Sea* to the west of the Sea of Aral. It is thought that these two "seas" together with Lake Balkash rather further east, are the remains of a very large sheet of water, which once spread all over this part of Asia. They are all gradually growing smaller. *Lake Baikal,* a fresh water lake, is on the north of the central plateau. The *Lena* takes its rise from it.

*The Coast, Seas and Islands.*—Asia is a continent of peninsulas. We have noticed the three on the south coast. On the east coast we find two more peninsulas, Kamtchatka and Korea, and two islands, Saghalin in the north and Hainan in the south, close to the coast, which have all the effect of peninsulas. This results in a great number of gulfs and bays. Working round from the west, we find first the *Red Sea* dividing Asia from Africa, then the *Persian Gulf* between Arabia and Persia, the *Bay of Bengal* between India and Burma, the *Gulf of Siam* on the east of the Malay Peninsula, and all down the east coast a series of seas. Furthest north is the *Sea of Okhotsk,* next the *Sea of Japan* between the islands that form the empire of that name and the mainland, the *Yellow Sea* between Korea and the opposite coast of China, and the *China Sea* shut in by the *Philippine Islands* and *Borneo.* The fringe of islands turns westward and comes very close to the mainland in Sumatra. Other islands, in the south-east corner of Asia, stretch out towards Australia. *Java* and *Celebes* are the most important. Beyond Celebes are many other islands, ending with the very large one of New Guinea, which is considered part of Australia. All these islands are mountainous and volcanic. They are thought indeed to be, like the Andaman and Nicobar Islands, the remains of an old country of which the mountain peaks alone remain above the sea, the lowlands having been drowned. Japan, in particular, has a very famous volcano, Fuji-Yama, in the centre of the biggest Island, Honshu. Not many years ago there was a great eruption here, and earthquakes often take place. A very terrible one in 1923 practically destroyed the capital, Tokyo, and another at the beginning of 1927 did terrible damage round the towns of Kobe and Osaka. With so many enclosed seas, we have several important straits giving entrance to them—*Bab-el-Mandeb*, which means the "gate of tears," so called because of its dangers in the old days of sailing ships at the southern end of the Red Sea—the *Strait of Ormuz*, leading into the Persian Gulf—the *Straits of Malacca*, between Singapore and Sumatra.

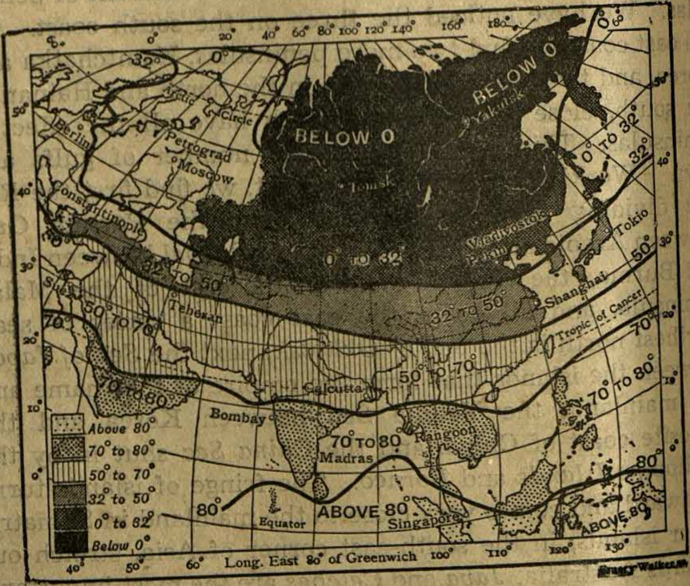

FIG. 214.—Temperature Map: January.

CLIMATE

There are greater extremes of climate in Asia than in any other part of the world. This follows partly from the fact that it is the largest land mass, stretching across all the zones from Arctic to Torrid.

Now compare the winter and summer maps. In winter the Isotherm of freezing point, 32° F., comes down to the middle of the Caspian Sea and passes through Tibet. In summer, temperatures about the freezing point have disappeared, and the Isotherm of 70° F., runs far north of the Caspian Sea across the middle of Siberia. That is to say, the difference between summer and winter temperatures in the whole of Central Asia is more than 40 degrees.

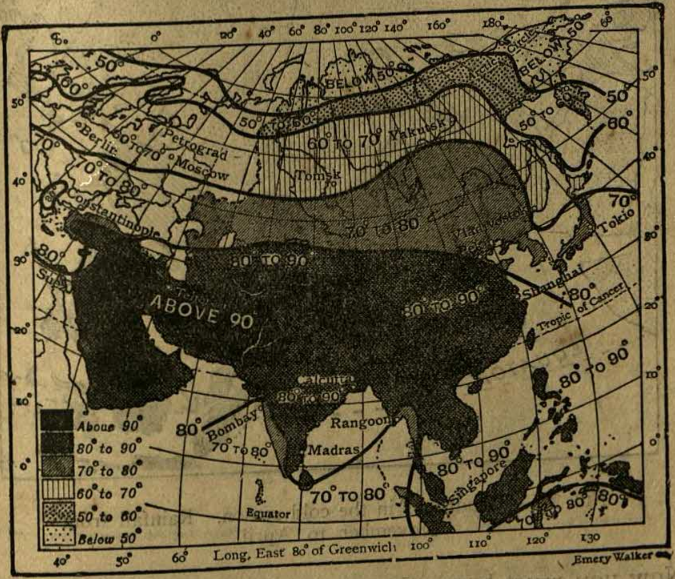

FIG. 215.—Teperature Map: July.

Even Irkutsk is not the most extreme place in Asia. Some little way further north, right in the Arctic Circle, is a place called Verkhoyansk. Here the difference is between—60°, a terrible cold which we cannot even imagine here, and 40°, i.e., a whole 100 degrees. Both Verkhoyansk and Irkutsk are in the centre of the land.

Here are the rainfall maps of Asia (Figs. 216 and 217).

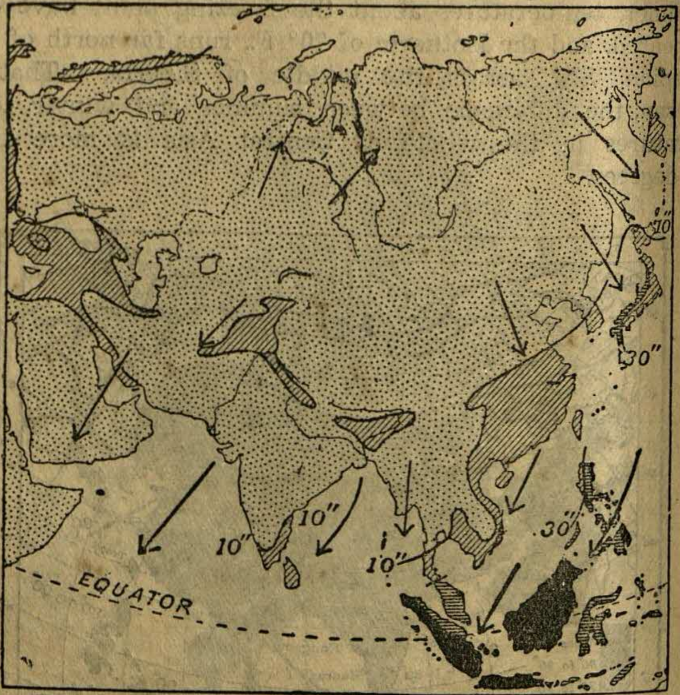

FIG. 216.—Conditions in the cold season. Rainfall from November to April.

Now you must know the great essentials of the climate of Asia—dry during half the year and wet during the other half of the year.

The following climatic regions may be noted:—

(1) *The Equatorial Climate*, found in the East Indies and Malaya, with heat and rain all the year round.

(2) *The Monsoon Climate*, which is the climate we have in India, with a Dry Cool Season, a Hot Season when the land is getting heated up, and a Wet Season when the wind

is blowing inwards from the sea. This climate is found in India, Indo-China, and part of China. China is colder than India, and the climate may be called "Warm Temperate Oceanic," or "China Type". Japan has a similar but less extreme climate, with the wet season in winter on the north coast.

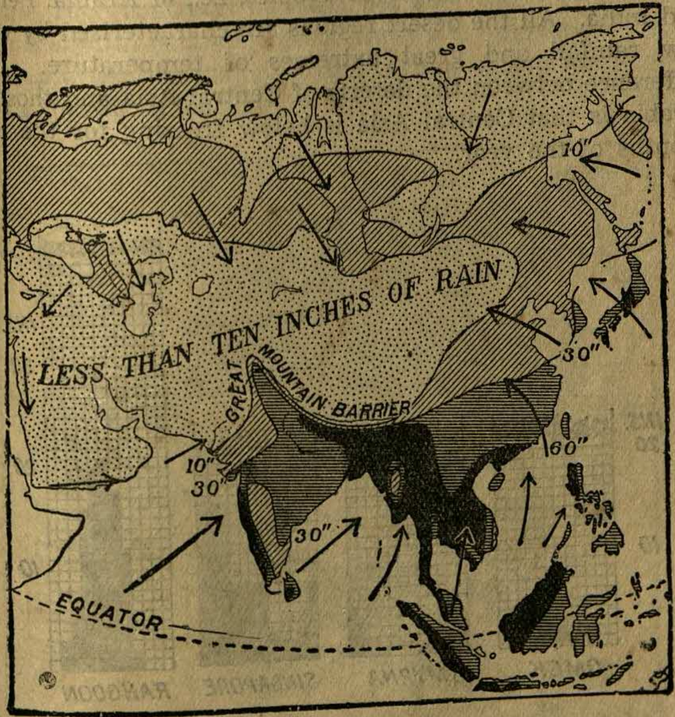

Fig. 217.—Conditions in the hot season.—Rainfall from May to October.

The warm moist winds bring a heavy rainfall to the coasts. All parts marked black have more than 60 inches of rainfall. But the winds lose all their moisture before they reach the hot interior of the continent which has less than 10 inches of rain in the half year.

(3) *The Desert Climate of Central Asia.*—Although the great deserts of Central Asia—the Deserts of Gobi or Shamo—are outside the Tropics, the climate is somewhat similar to the deserts found within the Tropics, i.e., of Arabia, Persia, and India. All the desert regions are characterised by very low rainfall and great extremes of temperature. The difference between the deserts of Central Asia and those of Arabia is that Central Asia is below freezing for the cold months of the year.

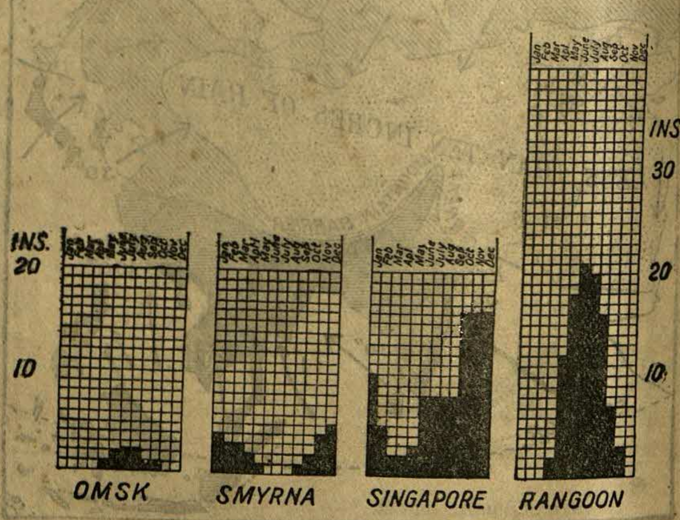

FIG. 218.—Asia, some typical Rain charts.

(4) *The Temperate Grassland Climate* occurs to the west, where Asia adjoins the steppe land of Europe.

(5) *The Cold Temperate Climate*, with Coniferous Forests, is found in Siberia.

(6) *The Arctic Climate* occurs in the north.

(7) *The Mediterranean Climate* with rain in winter occurs in Asia Minor and Syria.

## NATURAL REGIONS

In so huge a continent as Asia, with so many varieties of limate, such contrasts between hot and cold, wet and dry, here is sure to be a very great variety of vegetation. Here s a map where the major natural regions of Asia are shown. et us consider them one by one.

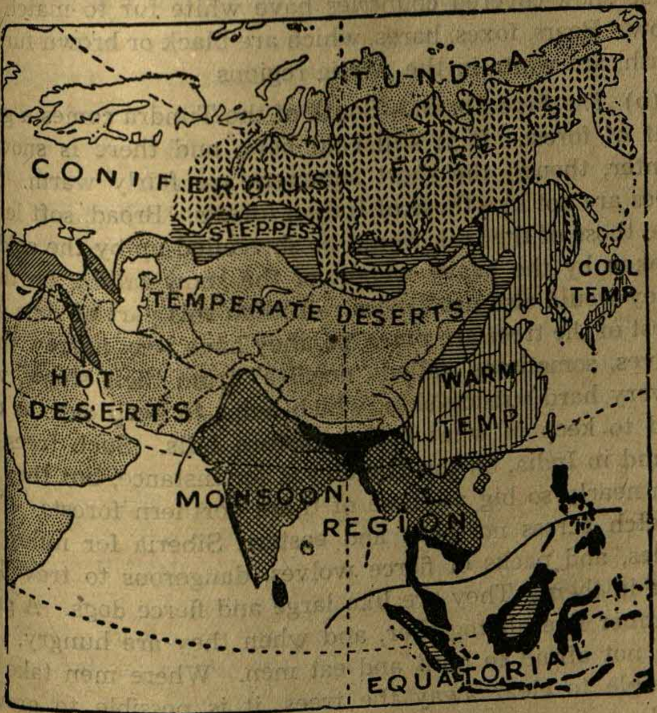

FIG. 219.—The Natural Vegetation of Asia.

(a) *The Tundra.*—This, as you see from the map, is the inge of very cold land round the Arctic Ocean. It is overed with ice and snow for the greater part of the year, nd thus naturally very few plants will grow. Nothing is found here but moss and just a few low berry-bearing bushes. There cannot therefore be much animal life either. The reindeer can feed on moss and is useful to the few people who live here. There are also a few animals, of which the Polar bear is the biggest, that are covered with fur to keep out the cold, and live mainly on fish which they catch in the sea. Nearly all those animals which live in these snow-covered countries have white fur to match the snow. Bears, foxes, hares, which are black or brown further south, are white in the Arctic regions.

(*b*) *The Pine Forest.*—South of the Tundra comes a great belt of forest. It is still cold here, and there is snow in winter, though the short summers are fairly warm. The trees are not like those of Indian forests. Broad, soft leaves like those of the teak would be shrivelled up by the cold, or broken by the heavy weight of the snow falling on them. They would also need more rain than this part of Asia gets. Most of the trees are *pines*, i.e. they have very narrow sharp leaves, sometimes, called "needles" from their shape, with a very hard outside skin, which helps to keep *out* the cold and to keep *in* what little moisture falls. Such trees are found in India, on the Himalayas for instance, but they are not nearly so big as those of these northern forests. They stretch across northern and eastern Siberia for miles and miles, and packs of fierce wolves, dangerous to travellers, live in them. They are like large and fierce dogs. A great number live all together, and when they are hungry, they are not afraid to hunt and eat men. Where men take the trouble to clear away the trees, it is possible to grow a little grain, not rice of course, not even wheat, but barley and rye, which will bear cold.

(c) *Steppes or Grassland.*—On the western side of Asia south of the pine forest, comes a long strip of land that runs right across into Europe. It has not quite so extreme a climate and it is flatter and less hilly. Most of it has a fair summer rainfall and this is one of the great wheat-growing regions of the world. The best of it is, however, at the European end of the strip. In Asia, as the climate grows drier and drier towards the desert, wheat gives place to grass, on which flocks and herds are fed. These plains are upposed to be the original home of the *horse*, which we ow find in so many parts of the world, and great herds, more or less wild, are still found there.

(d) *Desert.*—As we move southward and eastward from he steppes, the rainfall grows less, the grass thinner and oorer, and we find ourselves in the desert, which stretches n a great belt right across Asia from south-west to north-ast, from Arabia to Mongolia. In some parts there are eep rocky mountains, in others great wastes of sand, blown bout by the wind. One region in Persia is a "salt" desert, here the salt crystals lie like a crust on the ground, making painful glare in the sunlight. There is hardly any rain or getation. Only in the rather more favourable places a ttle coarse grass, or thorny bushes, or dwarf acacia trees, n which goats, camels and asses, the chief animals of the sert can feed. In the Arabian desert date palms grow on e oases. These oases, and here and there a river valley, ch as the Oxus and Syr Daria, the Tarim, and especially esopotamia (the valley of the Euphrates and Tigris) show at the soil itself would be fertile enough if there were ore rain. It is indeed very largely this loose sandy soil of e desert, blown by the west wind across the plains of hina, that forms the "loess" soil there which is famous r its fertility. The south-west corner of Arabia known as emen, where the mountains catch what little moisture the oud may bring, is another patch of more fertile land. offee is here the chief production.

(e) *Mediterranean Region.*—On the western edge of the sert is a belt of land that receives a good rainfall in winter, t has hot dry summers. Such a climate is better for the growth of the trees with long roots and a steady continuous growth, than for grasses and grains. Accordingly we find the chief products of these Mediterranean lands to be fruit trees, such as vines, olives, oranges, figs. These trees are fitted in various ways to store up the moisture they gain in winter to last them through the hot summer. The Oxus and Syr Daria valleys are little oases of much the same type of vegetation. Mulberry trees for the feeding of silk worms are here important.

(*f*) *The Monsoon Lands.*—We now turn to the well watered Monsoon lands of southern and eastern Asia. We may divide them into two parts according to their latitude —(i) Temperate Monsoon lands, i.e., Japan, Korea, China as far south as the Si-kiang Valley where the winters are cold, and (ii) Tropical Monsoon lands, South China, the Indo-Chinese peninsula, Burma and India, where the temperature is high throughout the year.

(i) *Temperate Monsoon Lands.*—This would naturally be a land of forests; but the population being thick in the plains and river valleys the trees have been cut down and the ground cleared for cultivation. In North China wheat, barley and millet are the chief grains and beans are largely grown. In Japan, Korea, and the Yangtse Valley rice is the chief grain in spite of the cold winter, since there is plenty of summer heat which comes together with the rain. Cotton is another important crop in the Yangtse Valley, and opium is still grown in the hilly parts of Western China, though great efforts are being made to put down its cultivation because its use—except as medicine—does much harm. Oak trees north of the Yangtse Valley and mulberry trees south of it provide food for the silk worms that have for hundreds of years made China famous for silk. A great deal of tea is grown on the hills slopes south of the Yangtse, and again near Canton. Mulberry trees and tea are again typical Japanese products.

(ii) *Tropical Monsoon Lands.*—These include South China, Indo-China, Burma and India. The full list of productions would be a long one. Rice is the chief grain grown on all the plains, especially the great river deltas. Tobacco and sugarcane are other important lowland crops. Cotton flourishes in the drier parts. Tea is grown on the hill slopes, and rubber in the thick damp forests that face the wet Monsoon.

(*g*) *Equatorial Belt.*—Lastly we come to the lands of continual rainfall and moist heat near the Equator. Since these consist of islands and a narrow peninsula, and are all mountainous and clothed with very thick jungle, there will not be much room for growing grain on any large scale. Sago and tapioca are obtained from trees of the palm type growing in these regions, as well as the more familiar cocoanuts along the sea-shore. Spices of all sorts are some of the most important products. Some coffee is grown in hilly parts. Rubber is being more and more grown, especially in Ceylon and the Malay Peninsula, and the cinchona tree from which quinine is made, is largely cultivated in Java. Tobacco, sugarcane and rice grow where there is enough cleared level ground.

**Minerals.**—The minerals of Asia are almost as varied as the vegetation, though less important. *Oil* may be counted the chief. It is found on the slopes of the Caucasus, near Baku, in Mesopotamia and Persia, in Burma, in the East Indian Islands, and a certain amount in Japan. There are mmense quantities of coal in China, but it has as yet been very little worked. Japan also has both coal and iron, as has India, though not much, and where these two are found together we get the most important manufacturing districts of Asia. Sumatra, Borneo and two smaller East Indian slands also produce coal. The Malay Peninsula is the most mportant part of the whole world for tin. Silver and lead are found in Burma and South China, rubies and other precious stones in Burma and Ceylon. Gold is found in Siberia, in the Lena Valley, and in the Ural Mountains—together with small amounts of copper and platinum.

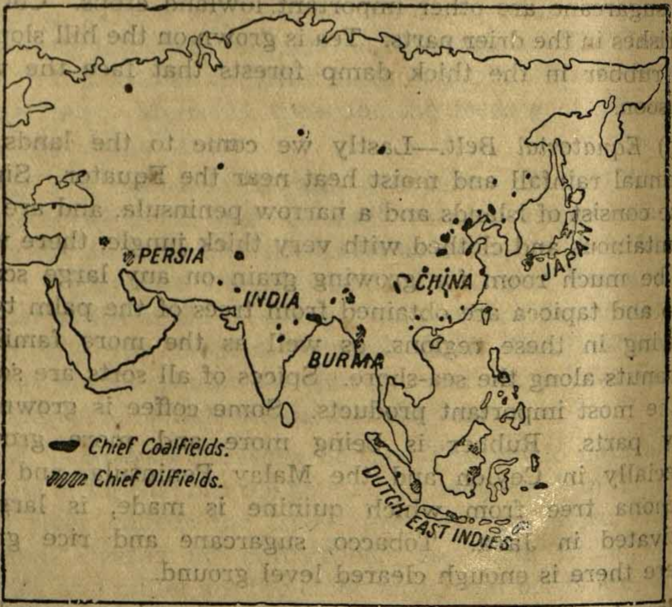

Fig. 220.—Coal and Oil in Asia.

**Population.**—When we compare a population with a rainfall map, we see that the two are much alike.

Just as the Monsoon lands of the south-east have the richest vegetation, so they have the thickest population. It is thickest of all in the great river valleys (especially the Ganges) and deltas, and round the sea-coasts of India. The largest dark patch of all (over 200 inhabitants to the square mile) is on the plains of China, which include the valleys of the Hwang-ho and Yangtse-kiang and nearly all the coastal plain. The mountainous parts of the Indo-Chinese Peninsula, together with Assam and the Himalayan regions of India, are the least thickly populated of the monsoon lands (an average of 50 to the square mile). Japan like the Plain of China and the Ganges Valley has a population of over 200 to the square mile, and so has Java. The latter island has been much more developed than Sumatra and Borneo. As we move towards the drier lands we find the population growing less. In the Mediterranean lands the coast plain of Asia Minor has between 50 and 100 inhabitants to the square mile, while Syria and Palestine have about 50 or

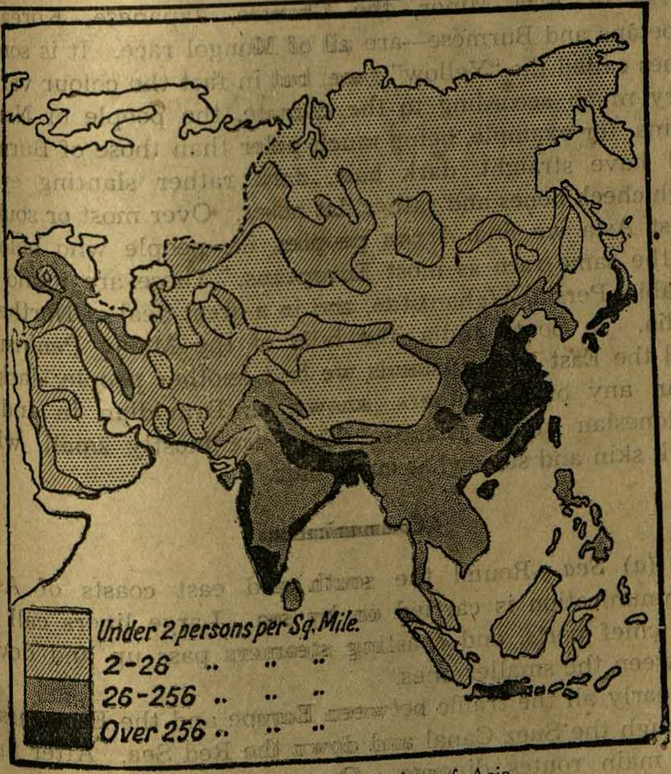

FIG. 221.—The Population of Asia.

under. Arabia, Persia, Afghanistan, with Turkestan and most of Siberia, have an average of 10 or less, while northern Siberia and Central Arabia have a very thin and scattered population, barely one person to a square mile.

**Races.** The most numerous are the *Mongols.* They get their name from Mongolia, a district of Central Asia; but most of the tribes of Siberia and Turkestan, as well as the Turks of Asia Minor, the Chinese, Japanese, Koreans, Tibetans and Burmese—are all of Mongol race. It is sometimes called the "Yellow" race; but in fact the colour varies very much according to the climate, the people of North China, for example, being much paler than those of Burma. All have straight, dark hair, dark rather slanting eyes, high cheek bones and rather flat noses. Over most or south-west Asia we find *Aryan* peoples, i.e. people who belong to the same race as most Europeans. These are found in Arabia, Persia, Afghanistan, and in a great deal of Northern India. In South India, the hills of the Malay Peninsula and the East Indian islands we find another people, darker than any of the others, known as Dravidian in India, Indonesian in the islands. They are mostly small, with dark skin and somewhat curly hair.

### Communications

(*a*) *Sea.*—Round the south and east coasts of Asia communication is carried on by sea. Large liners call at the chief ports, and coasting steamers pass up and down between the smaller ones.

Nearly all the traffic between Europe and the East passes through the Suez Canal and down the Red Sea. After that the main routes diverge. One goes to Karachi, one to Bombay. Others go to Colombo, and thence divide again passing to Calcutta, to Rangoon, to Singapore, or turning south to Australia. From Singapore some steamers go to Australia, others to Hong-Kong, Shanghai and Japan. Thus

Aden at the south end of the Red Sea, Colombo in Ceylon, and Singapore at the end of the Malay Peninsula, are all "junctions" for steamer lines, and owe much of their importance to this fact. The north coast is of little use for communication, because it is ice-bound.

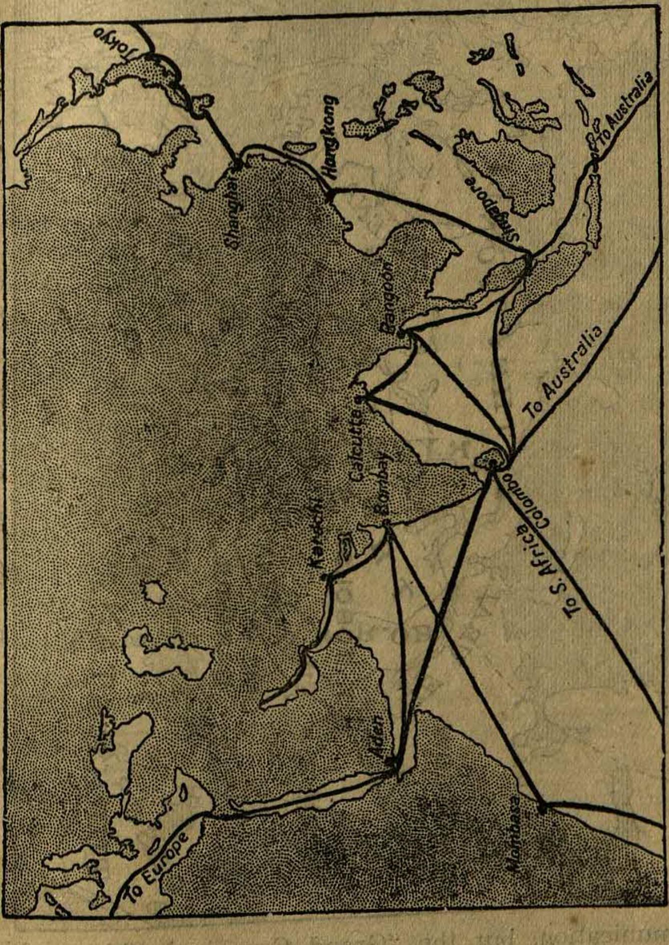

FIG. 222.—Chief Sea-routes of Asia.

(b) *Rivers.*—There are useful navigable rivers in the south-east. Canals in Asia are more for irrigation than for communication, but the "Grand Canal" of China, which links the Yangtse with the Hwang-ho, is for the latter purpose.

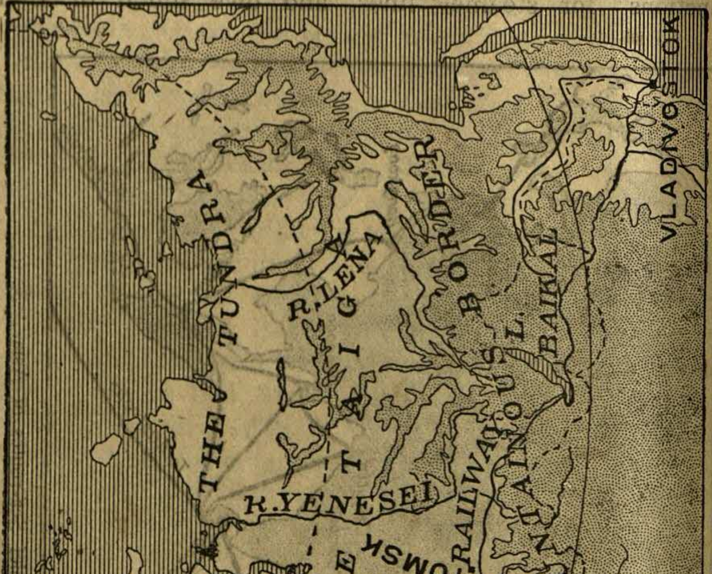

FIG. 223.—The Trans-Siberian Railway.

(c) *Railways.*—There are not nearly as many railways in Asia as in Europe, and we may notice that just those parts which are best off for natural communications have also most railways, while those that lack sea ports and navigable rivers lack railways too. There are more railways in India than anywhere else in Asia. In China, the chief railways run north and south, thus linking up the great east-west river valleys. The longest and the most important railway, is the Trans-Siberian Railway, which runs right across the continent, from Leningrad in Europe to Vladivostok on the Pacific coast. The train takes about eleven days to complete the journey. This railway gives the means of communication to places which without it would be very difficult to reach, and has been of great use in developing the country, or to grow grain or vegetables, or to make butter to send to other places.

In Western Asia there are one or two more important railways. First, the Baghdad railway. This starts from Scutari in the north-west corner of Asia Minor, opposite Istambul (Constantinople) and crosses the plateau. It was completed to Baghdad in 1940, and now connects with the older line to Basra on the Persian Gulf. From Aleppo a branch runs due south into Arabia. The object of this is to carry pilgrims to Mecca and Medina, the great sacred Mohammedan cities. The last railway to notice is the Trans-Caspian, which, starting from the eastern shore of the Caspian Sea, passes through Turkestan, crossing the Syr Daria and Oxus valley, and curves round the north of the Sea of Aral back to Europe. This makes possible a great deal more trade for these fertile river valleys than could otherwise be the case, shut in as they are by desert lands.

(d) *Aeroplanes and Airships.*—As time goes on these will no doubt prove the best means of conquering the difficulties of desert communication. We have already spoken of the new route to India *via* Baghdad. Another shorter line runs from Damascus to Baghdad.

## THE COUNTRIES OF ASIA

**Russian Asia.**—Look at the political map of Asia, there is a great strip across the north, and quite a large part of the west, down to the level of the Caspian Sea. These great territories are under Russian government. On the newest maps you will see them noted as belonging to the "Union of Socialist Soviet Republics". The most important divisions are Siberia, and Turkestan or Turan.

### SIBERIA

This includes the Tundra and Forest regions of northern Asia. Few people can live here, because of the cold climate and the lack of vegetation. Here there are only a few wandering tribes of people called *Samoydes,* who mainly depend on their herds of reindeer for food, and on the fur of the animals they kill for clothing. They live by hunting and trapping fur-bearing animals. They cut down the pine trees to make themselves houses; but, in spite of the value of the timber, there is not much of a lumbering industry, as it would be so difficult to get the timber to places where it could be used. On the south-west side of Siberia is the steppe land known as the Black Earth region, which is good for growing wheat. At the edge of the wheat land is good pasture for cows and sheep, so that here there is a much bigger and more settled population, occupied in agriculture and dairy farming. The Siberian railway is important for the development of this country. Most of the towns are on or near it, except *Tobolsk,* which stands where the Irtish is joined by a large tributary some way north of the railway. The other towns are *Omsk, Tomsk, Irkutsk,* the last near Lake Baikal. None are big, and all are important chiefly as collecting or market towns for the districts round them. On the Pacific coast is the port of *Vladivostok*. This would be valuable if it were not closed by ice for some months of the year.

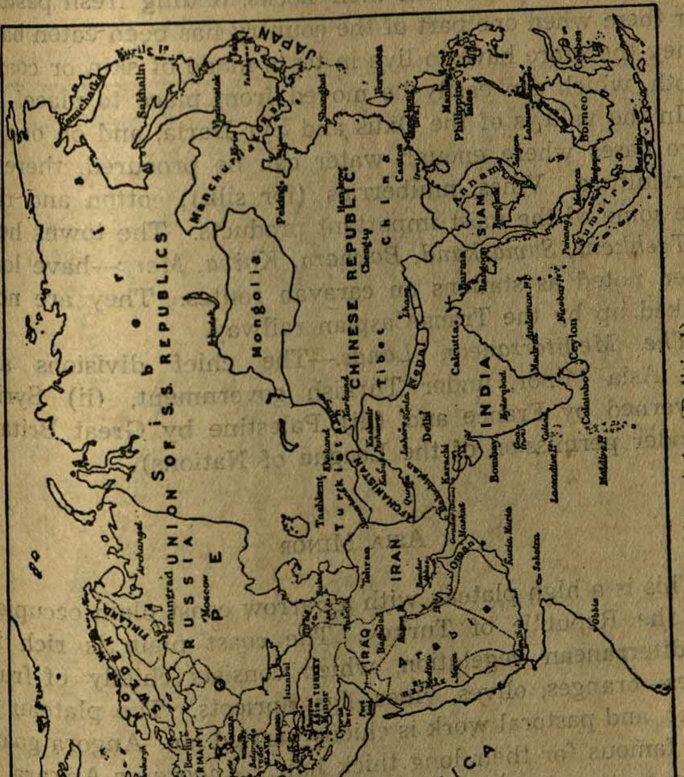

FIG. 224.—Asia (Political).

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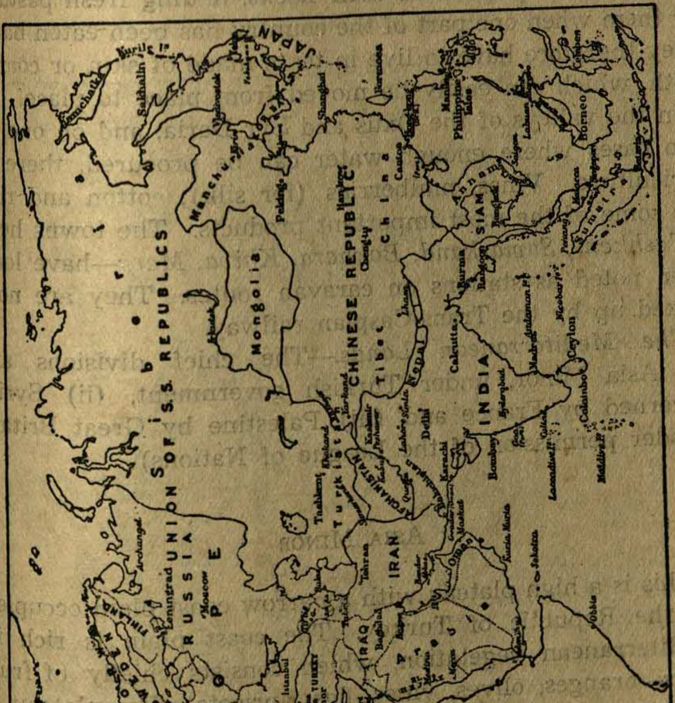

FIG. 224.—Asia (Political).

*Vladivostok.* This would be valuable if it were not closed by ice for some months of the year.

### TURKESTAN

This covers the drier, less valuable steppe land. Over it scattered tribes live a nomadic life, that is they wander from place to place with their flocks, finding fresh pasture for them when one part of the country has been eaten bare. They therefore have to live in tents made of skin or coarse cloth, which can easily be moved from place to place.

In the valleys of the Oxus and Syr Daria, and on one or two oases where enough water can be procured, there is agriculture. Vines, mulberries (for silk), cotton and rice are some of the most important products. The towns here —*Tashkent, Samarkand, Bokhara, Khiva, Merv*—have long been noted as stations on caravan routes. They are now linked up by the Trans-Caspian railway.

*The Mediterranean Lands.*—The chief divisions are (i) Asia Minor, under Turkish government, (ii) Syria, governed by France and (iii) Palestine by Great Britain (under permission of the League of Nations).

### ASIA MINOR

This is a high plateau with a narrow coast plain occupied by the Republic of Turkey. The coast plain is rich in Mediterranean vegetation, which consists chiefly of fruit trees—oranges, olives, vines, figs, apricots. The plateau is drier, and pastoral work is chiefly carried on. Angora goats are famous for their long thick hair. *Angora* or Ankara, a town on the plateau, has lately been made the capital of the Turkish Republic in place of Istambul, which stands on the European side of the Bosporus Strait. The other towns are on the sea coast. *Smyrna* has long been the chief port; but it was burnt down by the Turks, who were then fighting the Greeks, in 1922, and has not yet been fully rebuilt. *Brusa*, a little further north, is noted for silk, *Sinope* and *Trebizond* are Black Sea ports.

### SYRIA AND PALESTINE

Here again we have the fertile sea coast, soon merging into desert. Agriculture is the occupation of the people. *Damascus*, an old and famous city, is the capital of Syria, and *Beirut* its chief port. *Jerusalem*, the Holy City alike of Jews and Christians is the capital of Palestine, with *Jaffa* for its port. The fertile land is divided from the desert by a

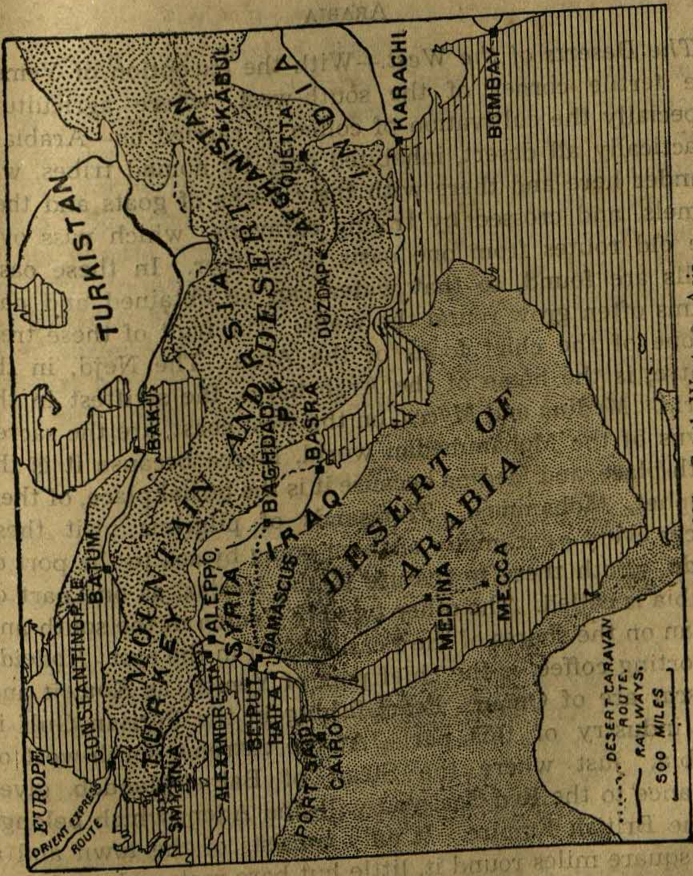

FIG. 225.—South-Western Asia.

valley that runs straight north and south. Through this valley the river Jordan flows, to lose itself in the Dead Sea (so called because its water is of a peculiar saltness that will allow no creature to live in it).

## ARABIA

*The Deserts of the West.*—With the exception of Yemen, the fertile corner of the south-west, where agriculture, especially the cultivation of coffee, is carried on—Arabia is practically all desert, inhabited only by nomad tribes, who wander here and there with their flocks of goats and their camels, and crossed by tradng caravans, which pass over the old routes from one oasis to another. In these oases wells are found, so that water can be obtained and date palms often grow round the wells. The fruit of these trees is one of the chief foods of the Arab. The Nejd, in the centre, is the home of the Arab horse, the swiftest in the world. *Medina* and *Mecca*, on the west coast, are the sacred towns of the Mohammedan world, Mecca because it is the birth-place, and Medina because it is the burial place, of their Prophet, Mohammed. Thousands of pilgrims visit these places every year, many of them going by sea to the port of *Jidda*. Both these towns are in the Herjaz, as one part of Arabia is called. The other two are Yemen in the south and Oman on the shores of the Persian Gulf in the east. *Hodeida* exporting coffee, is the chief port of Yemen, as *Koweit* and *Muscat* are of Oman. Pearl fishing in the Persian Gulf is the industry of this part. At the extreme south-west of Arabia, just where the Strait of Bab-el-Mandeb gives entrance to the Red Sea, you will find Aden, which belongs to the British Empire. It only consists of the town and a few square miles round it, little but bare rock and sand; but it is important, first, as commanding the entrance to the Red Sea, through which nearly all ships to India and the East come, secondly, as a convenient station for supplying these ships with either coal or oil for their engines. There are oil fields near the shores of the Persian Gulf.

### IRAQ (MESOPOTAMIA)

The valley of the Euphrates and Tigris runs between the Arabian and Persian deserts, as the valley of the Nile runs across the Sahara. Once this country was far better irrigated and cultivated than now. It produced one of the oldest civilizations of the world. *Nineveh* and *Babylon* were both built here, but now only their ruins remain. *Baghdad,* famous in the Arabian Nights stories, is still the capital, and an important trade centre on the route from Iran to Arabia. *Basra* is a port at the head of the Persian Gulf. Most of the people are engaged in agriculture; wheat, barley, cotton and rice, as well as dates, being grown. There are important oil wells both near Baghdad and further north, near Mosul, and elsewhere.

### IRAN

Here again the coastal strips, near the Caspian Sea in the north and the Persian Gulf in the south-west, are agricultural lands, growing vines, mulberries, grain and opium poppies. The centre is a high plateau, mostly desert. In parts it is uninhabitable, in others flocks of goats and sheep are kept, and from their wool the Persian carpets, famous for their softness, and the beauty of their colouring, are woven by hand. *Tehran* in the north is the capital, now connected by railway both with the Caspian Sea and the Persian Gulf. *Isfahan* and *Yezd* are other trading centres on caravan routes. *Shiraz* on the western slope of the Zagros Mountains, is famous for its roses, from which a very valuable scent—Attar of Roses—is made. *Bushire* and *Bandar Abbas* are ports on the Persian Gulf. Iran, like Arabia, trades in pearls found in the Gulf, and the oil wells on the central plateau are becoming very important. The country is under the rule of the Shah or Emperor.

### AFGHANISTAN

This country, too, is in the dry desert lands. To the north and east the mountains grow steeper (Hindu Khush and Safed Koh to the north and Suleiman to the east). Their slopes obtain a little rain, and here, as well in the valleys of the Helmund and Kabul, some cultivation is carried on. A curious animal of this part of the country is the fat-tailed sheep, which stores up fat in its tail, from which it obtains nourishment when it can get hardly any grass to eat. *Kabul*, on the river of the same name, is the capital. *Kandahar* is another important town. The chief trade is with India through the Khyber Pass. Another route runs north throuh Herat to Merv in Turkestan. Goods are carried on ponies or camels.

*Trade Routes of South-Western Asia.*—The countries we have been studying as Mediterranean lands lie between Europe and India, and from earliest times the trade routes in this part of Asia have been of importance, particularly owing to large areas of deserts and mountains. Long ago two of the most civilised countries in the world were Egypt and Iraq. There is only one route between the two countries which avoids the desert. It passes through Palestine and Syria, through Damascus. How important Palestine must have been at one time. Often it formed a buffer state between the powers of Egypt and Babylon or Assyria. Now however, most of the trade between Europe and Asia passes through the Suez Canal. This sea route is controlled by Great Britain. In order to gain control over a land route from Europe to India, Germany planned what is called the Baghdad railway to run from Constantinople through Baghdad to the Persian Gulf. This railway is now controlled by Great Britain. On both the old and new routes notice the position of Aleppo, where the old caravan routes and the railway come down through the famous pass known as the *Cilician Gate* between Asia Minor and Mesopotamia. Nearby is the port of Alexandria, which has replaced the old port of Antioch.

*The Central Plateau.*—The whole of Central Asia is very high and mountainous. Communication is very difficult, and as most of these lands also have only a slight rainfall, there cannot be very much agriculture. They are mainly inhabited by a scanty population of somewhat backward peoples, elonging to the Mongol race. The main divisions are (*a*) ibet, (*b*) Sinkiang, (*c*) Mongolia. All three are supposed o form part of the Chinese Republic, but of late years, since o much confusion has existed there, these outlying parts ave become practically independent.

## TIBET

(*a*) This is the highest part of the tableland, well over 0,000 ft. high. It can only be reached over high and ifficult passes, and the Tibetans, thus naturally cut off rom the rest of the world, have further done their best to eep all foreigners out. They are Buddhist in religion and re believed to be about 2,000,000 in number and are divided nto Lamas or monks, and the lay people. The Grand or alai Lama is their religious head and the head of the government also. They live on whatever grain they can manage o grow in their somewhat desolate country. The Brahmautra and Indus both rise in Tibet; but the chief value of hese rivers is given to India. *Lhasa* is the capital and a acred town, where for a long time no foreigner was allowed o enter on pain of death. Within recent years the country as been opened for British trade.

## SINKIANG

(*b*) *The Province of Sinkiang* consists mainly of the valley f the Tarim river which rises in the Karakoram mountains and flows into the lake of Lob Nor. It is the most fertile part of the tableland, temperate grains and fruits growing well here. *Kashgar* and *Yarkhand* are the principal towns.

### MONGOLIA

(c) *Mongolia* is a vast area in the centre of Asia, nearly

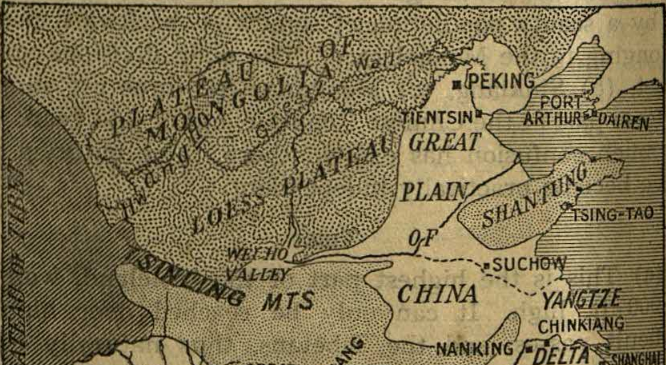

FIG. 226.—Map of China.

half the size of the Australian continent but only with one-quarter of the people. It consists of the great desert of Gobi or Shamo. It stretches from Siberia to China. The people are nomads, wandering about with their flocks of camels, horses and sheep. Irrigation is required to make the land productive. Settlers from China are cultivating some of the border tracts near China. Some parts are known to be rich in minerals. The principal trading centre is *Urga* which can now be reached by motor cars from *Kalgan*.

### MANCHUKUO

(*d*) This new republic lies to the north of China and Korea and is yearly increasing in importance. Its soil is rich, and every year numbers of Chinese enter it. The crops are soya beans, wheat and millet. This region is the prospective wheatland of the world, and the credit of developing it should go to the Japanese, who built and own railways, and who have introduced flour milling. The Kwantung Peninsula with the ports of *Port Arthur* and *Dairen*, belongs to Japan.

Near the mouth of the Si-kiang lies the small island of Hong-Kong, a British possession. The island is separated from the mainland by a strait only half a mile wide and on the shore of the mainland is *Kowloon*, part of the colony. The strait forms a wonderful harbour and Hong-Kong is visited by 25,000 vessels every year. There being no customs duties, Hong-Kong is considered as a free port. The trade of South China passes through this harbour and the Chinese living here or in Kowloon number not less than 600,000. There are ship-building yards and sugar factories.

*The Monsoon lands.*—This is the most important part of Asia, the well-watered, fertile, thickly populated Monsoon lands. Of these, India has been treated in greater detail.

There remain Burma, China and the rest of the Indo-Chinese Peninsula.

## BURMA

Once a province of India, Burma was detached from the former in 1935, and set up as a separate entity within the British Commonwealth[1] with initial stages of self-government. Included in the Province are the numerous native states, collected together as the Federated Shan States, as well as some hilly tracts not administered at all.

*Physical Features.*—The mountain ranges and the rivers run from north to south. The mountains, again, are arranged like the fingers of a man's hands. The river Irrawaddy is navigable by steamers as far north as Bhamo, nearly 1,000 miles from its mouth. Its big tributary, the Chindwin, is also navigable for several hundred miles. The smaller tributaries are used for floating logs of timber from the forests to the main river. Both the Arakan and Tenasserim coasts are rocky and fringed with numerous islands.

*Geology.*—The Arakan Yomas and the Pegu Yomas are two fold ranges of young rocks. Between the two lies an area of young soft rocks, little folded, forming the valley of the Chindwin and the Lower Irrawarddy. It is here that the great oilfields of Burma are found, and Burma produces about 270,000,000 gallons of oil every year. The wild mountainous eastern half of the province consists of old hard rocks. In the north rubies and other precious stones are found at Mogok. At Bawdwin is one of the largest deposits of silver and lead ore in the world. The ore is smelted nearby at Namtu. There are big deposits of silver and lead ore near Heho farther south. Tenasserim has rich deposits of tin, especially around Tavoy, and with the tin is found wolfram. Wolfram is used for mixing with iron to make certain kinds of steel. There are numerous deposits of poor quality coal in Burma, but they are not yet mined.

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[1] Burma is now no more a member of the British Commonwealth of Nations.

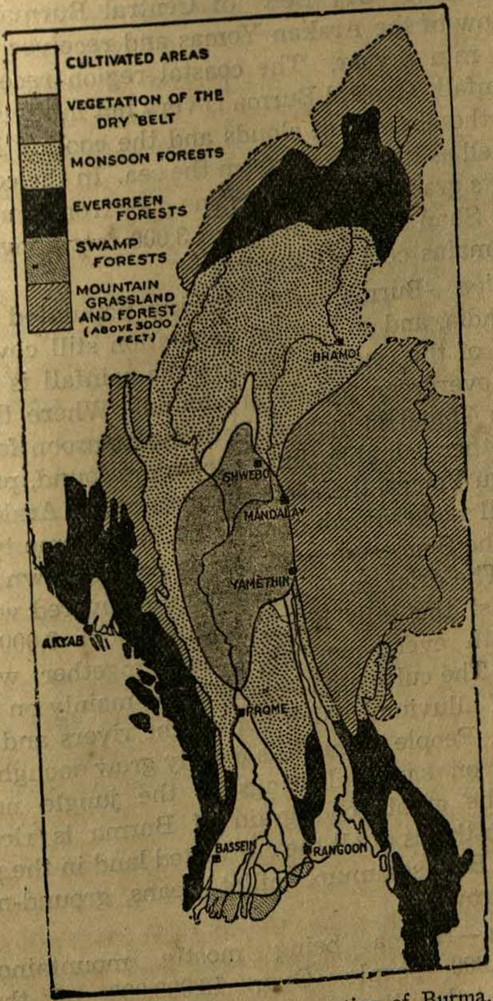


FIG. 227.—The natural vegetation of Burma.

*Climate.*—The "Dry Belt" of Central Burma lies in the rain-shadow of the Arakan Yomas and receives less than 40 inches of rain a year. The coastal region receives a very heavy rainfall. Central Burma is very hot in the hot weather owing to the absence of clouds and the cooling influence of rain, as well as its distance from the sea. In the cold weather Burma gets gradually cooler as one goes from south to north. The great Shan Plateau averages 3,000 feet above sea-level, and so remains cool all the year.

*Vegetation.*—Burma is less thickly populated than most parts of India, and so natural vegetation still covers a very large part of the country. Where the rainfall is more than 80 inches evergreen forests are found. Where the rainfall is between 40 and 80 inches, there the monsoon forests with teak and other valuable timber trees are found, particularly on the Pegu Yomas, the eastern slopes of the Arakan Yomas and the hill ranges north of the Dry Belt. Some teak is also found on the Siamese border and is floated down the River Salween. The drier parts of Burma are covered with scrub-land, whilst the hills and plateaux above 3,000 feet are clothed with evergreen oak forests together with some grassland. The cultivated land is found mainly on the broad stretches of alluvium which border the rivers and build up their deltas. People of the hills merely grow enough for their own needs on small clearings in the jungle near their villages. The great food grain of Burma is rice, which occupies two-thirds of all the cultivated land in the province. In the Dry Belt sesamum, millet, beans, ground-nuts, and cotton are grown.

*Population.*—Burma being mostly mountainous has only 14,700,000 people. Over 12,000,000 of these are Burmans, and they live mainly on the fertile alluvial lands by the rivers. They are Buddhists by religion. They have no caste system, and in most respects men and women have equal rights. The hilly regions and the plateaux are inhabited by more backward people, such as the Chins of the Arakan Yomas, the Karens of the Pegu Yomas, the Shans, Palaungs, and the Was of the Shan Plateau, and the Kachins of the north. They number about a million. Then there are nearly a million Indians of all sorts who have settled in Burma.

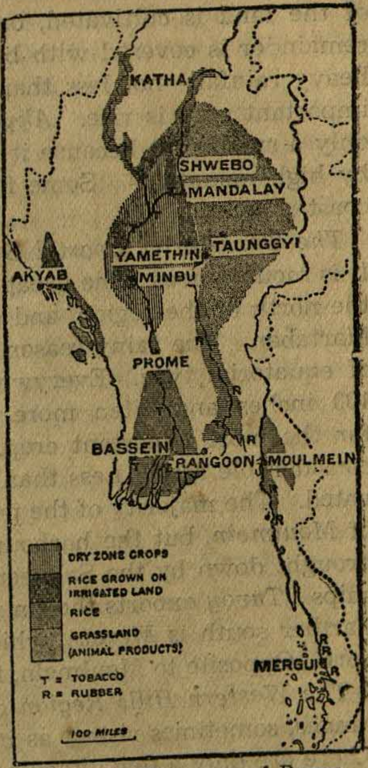


FIG. 228.—The crops of Burma.

*Natural Regions.*—

(1) The Arakan Coastal Strip—narrow, very wet and warm.

(2) The Tenasserim Coastal Strip—narrow, very wet and hot.

(3) The Western Hills Region (the Arakan Yomas), which forms the mountain wall between Burma and India.

(4) The Shan Plateau—with a moderate rainfall, thinly populated.

(5) The Northern Hills Region, in which the Irrawaddy and Chindwin have their upper courses.

(6) The Dry Belt of Central Burma.

(7) The Deltas of Lower Burma.

*The Arakan Coastal Strip* is rocky and there are numerous inlets and islands. The rivers are for the most part short rushing torrents from the mountains. Only one-tenth of the land is cultivated, one-half is waste land, and the remainder is covered with bamboo jungle. All parts get a heavy rainfall—not less than 100 inches. By far the most important crop is rice. *Akyab* has a good harbour, but is only a small port because it has a small hinterland backed by high mountains. Some fishing is carried out along the coast.

*The Tenasserim Coastal Strip* is like the Arakan coast. It is mountainous. The great Salween River passes through the north of the region, and empties itself into the Gulf of Martaban. The rainy season is prolonged and the forest is of equatorial type. Everywhere the rainfall is more than 100 inches and often more than 200. Rice is again by far the most important crop. Rubber plantations cover a considerable area. Less than one-tenth of the area is cultivated. The majority of the people lived around the old port of *Moulmein,* but the harbour is becoming choked by mud brought down by the Salween and is not suitable for large ships. *Tavoy* exports the tin which is mined in the district. Farther south is *Mergui,* which may become an important port. Opposite to Moulmein, there is a railway to Rangoon.

*The Western Hills Region* consists of a series of parallel ranges, sometimes rising, as in Mount Victoria, to 10,000 ft. There are only a few difficult mountain paths from one side to the other. From south to north there are the Taungup Pass, the An Pass, the Manipur Route, and the Tuzu Gap. The State of Manipur is situated on a broad plateau in the centre of the hills. The western slopes of the hill receive a heavy rainfall, but the rainfall rapidly gets less on the eastern side. The region is clothed mainly with a poor evergreen oak forest of little value. In places there are pine forests, but the forests are too difficult to reach for the timber to be of value. Large parts of the region are practically uninhabited. The few Chin inhabitants lead a miserable existence by growing a few crops on hillside clearings. The steep-sided valleys are often hot in the hot weather, but damp, cold, and feverish in the rains. There are really no towns in the region.

*The Shan Plateau* receives a moderate rainfall and a large area of the waste land is cultivated; the land is very sparsely populated and the Shans, Palaungs and Was are not progressive. Then there are areas of grassland suitable for sheep, goats, and cattle. Especially in the valleys there are valuable forests as yet little used. Two railways penetrate into the plateau; one from Mandalay through the hill station of Maymyo to Lashio. Near this railway, and connected with it by a narrow-gauge line, are the Bawdwin Mines and Namtu Smelting Works. From Lashio a road runs on to the Chinese border (Kunlong Ferry Route). North of *Lashio* is the border town and market of *Namkham.* The other railway runs from the Rangoon-Mandalay line at Thazi through the hill station of Kalaw to Shwenyaung. A road connects Kalaw with Taunggyi, one of the most important centres in the Shan States. To the north of the Shan Plateau lies the most important of the routes from Burma to China—along the Taping Valley through the town of Bhamo.

*The Northern Hills Region* slopes on the whole from north to south. The rainfall in the north is heavy—more than 80 inches—getting less as one goes southwards. The hills are clothed with valuable forests and much teak is obtained. In the north the country is wild, inhabited by a few Shans and Kachins and is little known. In this northern region lies the small town of *Putao,* 280 miles by mule track from the northernmost point of the railway. The terminus of the railway is at *Myitkyina* on the River Irrawaddy. The famous jade mines of Burma are in this region, and the jade is brought to Mogaung and sent to China through Bhamo. On the River Chindwin are several river ports such as *Kalewa.*

*The Dry Zone* is the second best region of Burma. It is a plain, and in the centre lies the mountain of Mount Popa nearly 5,000 feet high. Mt. Popa is an old volcano. The Dry Zone may be defined as the region of Burma which receives less than 40 inches of rainfall. In the centre the rainfall is as low as 20 inches. The natural vegetation is a poor scrub. One of the small trees is cutch, from which a yellow dye is made. There is a good population in the Dry Belt. Some parts, especially round Shwebo, south of Mandalay and near Minbu, are irrigated and paddy is grown. In other parts sesamum, millet, beans, ground-nuts and cotton—are grown. The great oilfields of Burma are situated in the Dry Belt. The most important is Yenangyaung; others are Singu, Minbu, and Yenangyat. Most of the oil is sent by pipe line direct to the refineries at Rangoon. The main highway through the Dry Belt is the River Irrawaddy. Along it are numerous river ports—*Myingyam, Pakokku, Magwe, Minbu,* and *Thayetmyo.* The Dry Belt is the natural centre of Burma, and from it all parts of the country are easily reached. So we find the old capitals such as *Mandalay* and *Pagan* are in the Dry Belt.

*The Deltas Region* comprises the most important part of Burma. It consists of the broad valley of the lower course of the Irrawaddy and its large delta, and the narrower valley of the Sittang and the much smaller Sittang delta. Separating these two alluvial plains is the low range of the Pegu Yomas, covered with valuable forests. *Rangoon* is situated at the southern end of the Pegu Yomas, and so commands both valleys. The rainfall is good, over most of the delta it is more than 80 inches, but decreases northwards. At the southern end of the Pegu Yomas, evergreen forest is found, but farther north are Monsoon Forests of teak, pyinkado and other valuable trees. It is the nearness of these forests to Rangooon and the sea which has made them specially important. The lower alluvial lands are almost entirely cultivated, and by far the most important crop is rice. All other crops are of little importance. The region is thickly populated except in the forests. The cultivators are mostly Burmans. The towns of the region are mostly collecting centres for rice—examples are *Henzada, Bassein, Maubin, Pegu.* Notice how well Rangoon is situated, so that it can collect the produce of nearly all parts of Burma and send it to foreign countries.

*Communications and Trade.*—The River Irrawaddy and its tributary the Chindwin are still the most important highways of Burma. Many of the creeks of the Irrawaddy Delta are used by quite large steamers, and two canals have been cut to make the journey across the delta from Bassein to Rangoon shorter. The rice grown in the delta is brought to Rangoon by "paddy boats" through the delta creeks. The small streams are used for floating logs of timber from the forests to the sawmills. The railways of Burma are all metre gauge. The main line does not run up the Irrawaddy Valley, but up the Sittang Valley to Mandalay. A fine new bridge, opened in 1934, now connects this with the continuation which runs to Myitkyina. Another line from Rangoon runs to Prome on the Irrawaddy, but the big oilfields and many towns of the Dry Belt can only be reached by river. Burma has very few roads. The roads which exist are small local roads, and there is not even a main road between Rangoon and Mandalay.

Burma has three main exports—rice, petroleum and its products, and teak. More than one-third of the exports of Burma go to India. Much of the rice is used to feed India and Ceylon. The imports are cotton goods from India, Great Britain, and Japan, and machinery from Great Britain and U.S.A. Most of the trade (86 per cent) passes through Rangoon. There is a small overland trade between Burma and China (through Bhamo) and between Burma and Siam, now called "Thailand".

## CHINA

China differs from India and Burma in being a temperate rather than a tropical country. The winters are really cold, frost and snow being frequent round about Peking; and the summers are hot, and the south-east wind brings abundant rain for half the year, so that vegetation is plentiful everywhere, and, from the Yangtse valley southwards, is more or less tropical in character. The basins of the Hwang-ho and Yangtse-kian are the most important part of China. Here a very dense agricultural population lives, largely, as in India, in villages; but there are also, especially along the coast and along the banks of the Yangtse, a number of flourishing towns and China is one of the most thickly populated countries of Asia. In the valleys of the Yangtse and the Hwang-ho every foot of ground is precious. All is needed for cultivation, and there is no room to spare for grassland for cattle. Thus there are few sheep or cows in China; but on the other hand pigs and ducks, both of which can be fed on waste products such as paddy husk, potato peel, vegetable stalks and so on, and do not require much room, are kept in numbers. Another result of the thick population is that many Chinese are anxious to leave their own country and settle in others, where there is more room. Thus we find a great many Chinese in parts of India. They are also found in the Malay Peninsula and the larger East Indian islands, and others are anxious to settle in Australia and on the west coast of America.

Like India, China is essentially an agricultural country. But the crops are mixed and the clever Chinese have practised the "rotation" of crops, and intensive cultivation for long ages. Except the Hwang-ho plains, there are few large areas of flat land; yet the population is as large as that of India. Hence the Chinese farmer has to cultivate his land carefully; he is more of a horticulturist than an agriculturist. He grows grains, fruit trees and also a little tea; he keeps pigs and silkworms. In the loess areas of the north, irrigation is often necessary. In the north the chief food crops are wheat, barley, millet, peas and beans; in the south rice and sugar are important. Still China grows scarcely enough food for her people; and sometimes there are famines. Cotton is an important crop, especially in the Yangtse Valley, and tea is grown in the south and west. Fat pork is a favourite food of the Chinese. There are large number of sheeps and silk culture is one of the most successful industries in the country, and it supplies a quarter of the world's total. One day China may become a leading nation in the production of materials. Important coalfields and the iron deposits in Shansi are amongst the largest in the world, those of *Tayeb* near Hankow being the richest. In Yunnan there are rich copper deposits, and north of Canton tin ore is produced, much of which is exported from Hong-Kong. Hunan produces half the world's supply of antimony. Gold and silver are also mined.

China, however, has not yet advanced in the way that Japan has done. The industrial revolution has only begun, and there are cotton and wollen mills as also silk factories in Shanghai, Canton and other large centres, as well as flour mills. But the interior continues to be backward, progress being hindered by civil wars, weak government and absence of some system of money, weights and measures. *Peking* in the extreme north was the capital until 1928. It was made so by the Manchus, who came in as conquerors from the north, and ruled the country till within the last twenty years, when the Emperor was deposed and the country became in name a Republic though it has in fact known no really settled government since. Peking still keeps a position of importance because it commands the northern trade routes through Mongolia, while it has easy access to the sea by its port, *Tientsin* on the Gulf of Pechili. *Shanghai,* just south of the mouth of the Yangtse (as Karachi is near, but not at the mouth of the Indus), is one of the greatest ocean ports in China. *Nanking,* now regarded as the capital, and *Hankow* are great river ports on the same river. *Ichang* is at the "head of navigation"; Nanking is also famous for the beautiful China cups, plates etc., that take their name from the country where they were first made. *Hangchow,* a little further south and *Canton* near the mouth of the Si-kiang are other great ocean ports. Just near Canton is the little island of Hong-Kong, which is part of the British Empire. Small as it is, it is very useful as a trading and coaling station, and as a centre for the English navy in Eastern waters.

The rivers serve still as highways of trade in the country. The railways here are poor and Peking is a railway centre of note. The Chinese railways have, however, been developed by the Japanese, British and Russians.

Until about 60 years ago, China would have nothing to do with foreigners. Hence the trade of China is only about two-thirds of the trade of India, and much less than that of Japan. Beans, raw silk and tea are the great exports of China. Raw cotton and some wheat are also exported. On the other hand, though China possesses enormous coalfields, far more coal is imported than is exported. Cotton goods and cotton yarn and petroleum are also important imports. Trade is chiefly carried on with Great Britain—either directly or through Hong-Kong—with the United States and with Japan and a great deal of tea goes to Russia. The greater part of the trade goes by sea, but a certain amount of the Russian tea trade is carried by the caravan routes across Mongolia. These caravans have to pass the Great Wall of China, built many hundreds of years ago to guard China from the Mongolian tribes. Large portions of it still remain, built of solid brick, with many watch towers and gateways on the main roads. China was attacked and invaded by Japan in 1937 and Chungking in the far interior became the

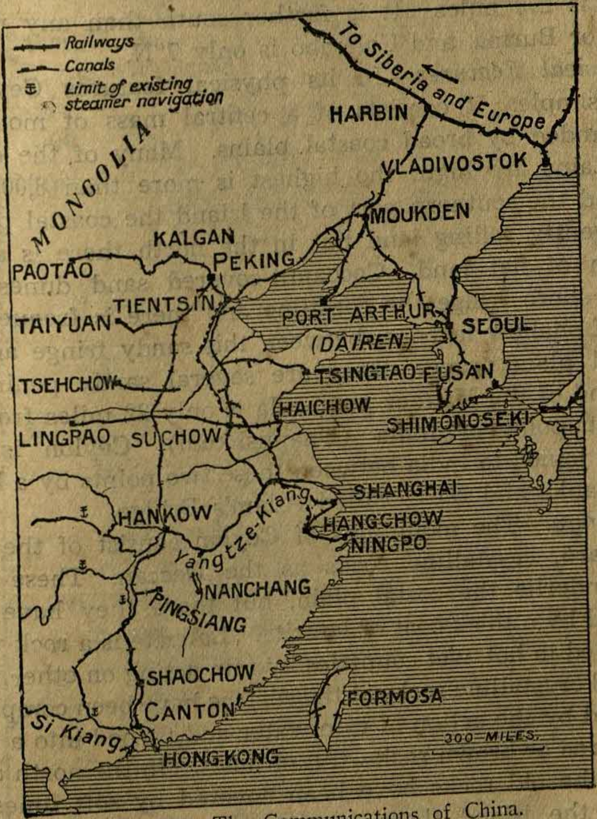


FIG. 229—The Communications of China.

temporary capital. Under the stress of war great progress has been made in development of manufactures essential for the war effort.

## CEYLON

*Position.*—Ceylon is a large island situated to the South of Peninsular India. It must once have been joined to India, and in many ways it is very similar. It has an area of about 25,000 square miles. The distance from north to south is 270 miles. It is farther south than any part of India or Burma, and Colombo is only 7°N.

*Physical Features.*—In its physical features Ceylon is very simple. It consists of a central mass of mountains surrounded by broad coastal plains. Many of the central mountains are high; the highest is more than 8,000 feet. Around the southern part of the island the coastal plain is low, gently rolling land but in the north there is a wide stretch of flat land. Cocoanut-covered sand dunes or a sandy shore fringe the coastline and there is frequently a line of shallow lagoons; between this sandy fringe and the coastal plain proper, there are several sandy peninsulas. The end of the Manner peninsula is only 22 miles from the nearest point of India (Dhanushkodi). Ceylon is very nearly joined to India between these two points by a line of sand-banks and rocks called Adam's Bridge.

*Geology.*—The mountains of Ceylon consist of the same old, hard, crystalline rocks as the Deccan. These rocks also underlie the costal plain, but there they have been covered by a thick coat of *laterite*. Laterite is a rock which is formed in hot, wet countries by rain acting on other rocks. The old crystalline rocks at the surface have been completely changed by the action of rain-water and turned into a much softer, red or brown rock—full of holes. In the north of the island the old rocks have been covered by soft limestone. Round the island there are many sand dunes. The old crystalline rocks of Ceylon are noted for their beautiful gemstones and for the mineral graphite.

*Climate.*—Ceylon is near the equator and so is hot all the year round. The presence of the sea keeps the climate equable, and everywhere along the coast, land and sea

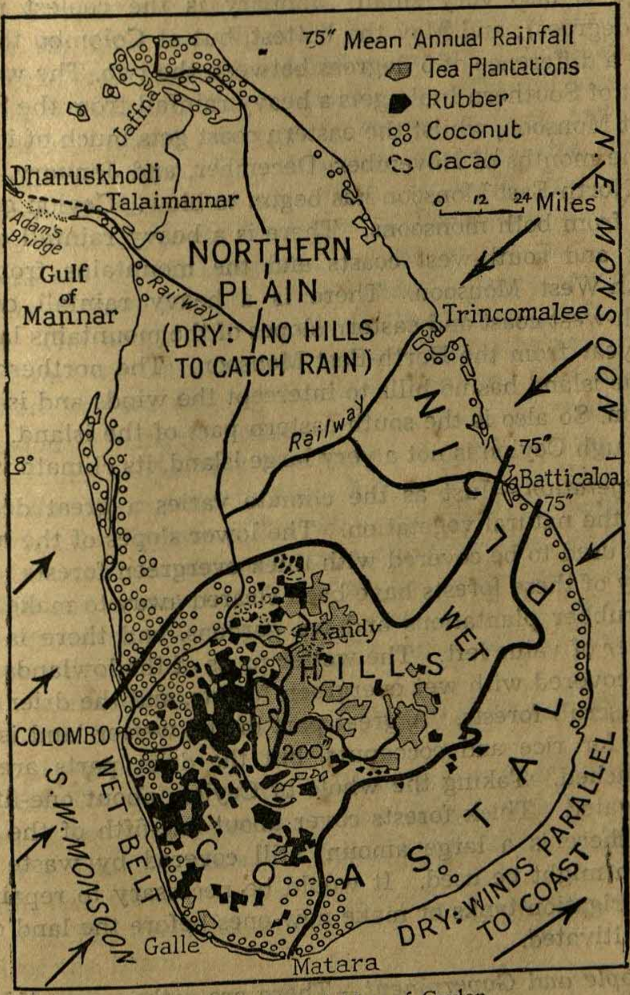


FIG. 230.—General Map of Ceylon.

breezes are felt. There is very little difference between the temperature of day and night, that is, the "daily range" is very small. At Colombo it is only 12 degrees. The annual range is also very small. January is the coolest month (80 degrees), and May the hottest, but at Colombo there is only a difference of 5 degrees between the two. The western coast of Southern India gets a heavy rainfall from the South-West Monsoon, whilst the eastern coast gets much of its rain in the months of November, December, and January, when the North-East Monsoon has begun to blow. Ceylon gets its rain from both monsoons. There is a heavy rainfall on the west and south-west coasts and the mountains from the South-West Monsoon. There is a heavy rainfall on the north-west coast and eastern slopes of the mountains later in the year from the North-East Monsoon. The northern part of the island has no hills to intercept the winds and is a dry region. So also is the south-eastern part of the island. Thus, although Ceylon is not a very large island, its climate varies.

*Vegetation.*—Just as the climate varies a great deal, so does the natural vegetation. The lower slopes of the mountains used to be covered with thick evergreen forests. Now many of these forests have been cleared away to make room for rubber plantations and tea gardens, and there is little timber of value left. The wetter parts of the lowlands were also covered with wet evergreen forests, and the drier parts with scrub forests. A great part of the wetter land is now used for rice and cocoanuts, but the drier parts are still untouched. Taking the whole of Ceylon, about one-fifth is cultivated. Thick forests cover about one-fifth of the area, and there is a large amount still covered by waste land which might be used. It would be necessary to repair the old irrigation tanks or make new ones before the land could be cultivated.

*People and Government.*—There are rather over 4½ million people in Ceylon. The principal race is the Shinhalese or Ceylonese, who, between 2,000 and 3,000 years ago, came from the north of India and settled in Ceylon. The

Sinhalese are Buddhists by religion. At Kandy is the Temple of the Tooth, where a tooth of Buddha is preserved. It is one of the most sacred places in the world to Buddhists. The north of Ceylon is inhabited mainly by Tamils, who are Hindus by religion. There are also many Tamils who have come from India as labourers in the tea gardens, and coffee and rubber estates. The Moors are Mahommedan traders, boatmen or fishermen who came originally from North Africa. The descendants of the old Portuguese and Dutch settlers are called Burghers. In the wilder parts of the mountains there are still a few Veddas, a very primitive hill tribe. The people live mainly on the wetter parts of the plains and on the hills. On the dry, unfertile soils of the northern regions and the east there are very few people.

Ceylon is entirely separated from India in matters of Government. The first Europeans to settle in the island were the Portuguese in 1505, followed by the Dutch and later by the English. The old Dutch ports are still to be seen. Ceylon was separated from the Presidency of Madras, in 1802 and made a Crown Colony and so became a separate country of the British Commonwealth. It is ruled by a Governor and an Executive Council, with a Legislative Council elected by the people.

*Natural Regions.*—This small country is divided into three natural regions:

(1) The Hill Country comprising the central mountain mass of the island and the surrounding foothills.

(2) The Maritime Belt or Coastal Plain of the east, south, and west.

(3) The north Limestone Plain occupying the northern end of the island.

*The Hill Country.*—The Hill Country is formed by the mountainous centre of the island. It consists of a series of ridges, separated by deep valleys running roughly from north-east to south-west. Very little is now left of the vast forests which covered this region before the days of European planting. The trees are nearly all evergreen and get smaller the higher one goes, so that above 5,000 feet the trees are too small to be useful as timber. At intervals there are broad, marshy or grassy plains—like those of Nuwara Eliya and the Horton Plains surrounded by mountains. The rainfall of most of the region is heavy; the rain does not fall as heavily as on the plains but is more continuous, and for days or even weeks together, the sun may be hidden by dense clouds of mist. The greater part of the rain falls during the South-West Monsoon—from June to October. Many of the rubber plantations are found on the lower western foothills of this region. Nearly all the tea gardens are on the higher parts. The latter are most numerous between Kandy and Nuwara Eliya. North and north-east of Kandy the cacao tree is grown, from which cocoa is obtained. Many of the valley sides are steep but are very carefully terraced for the growth of paddy. A large amount of coffee used to be grown in Ceylon, but as in South India, it is no longer important.

The old hard rocks which make up the mountain country are famous for gemstones, sapphires, spinel rubies, moonstones etc. There are hundreds of small gem-quarries, especially where the gems have been washed out of the old rocks and into the gravels of the valleys, as around *Ratnapura.* Another important mineral is graphite used for making lead pencils. The most important mines are in the Kurunegale district.

*Kandy,* the old capital, is in this region and is reached by a wonderful hill railway from Colombo, 72 miles away. *Nuwara Eliya* is a well-known hill station.

*The Maritime Belt.*—All round the mountainous centre of Ceylon there is a broad belt less than 500 feet above sea-level, which we may call the Maritime Belt or coastal plain. Over this coastal stretch, the old hard rocks are hidden by a deep red soil of laterite. All along the coast, thrown up by wind and waves, there are lines of sand dunes; just as on the west coast of India, large brackish lagoons are found behind the sandy ridges. The climate of the maritime belt varies greatly. The western and south-western sides get a heavy rainfall from the South-West Monsoon, the south-eastern side is dry, whilst the eastern side is again wetter, receiving its rain largely in November and December from thee North-East Monsoon. The wet low country is thickly populated and widely cultivated, especially on the west and south-west of the island. The level lands and valleys are occupied by rice-fields, yielding two crops a year, one after each monsoon. The higher lands towards the hills are covered by the mixed tree cultivation of the Sinhalese. Each farmer has coconuts, areca nuts, mangoes, yams or bread-fruit, together with small plants like pepper. On the borders of the hill country are rubber and tea plantations. All along the coast are groves of coconuts. The husks are allowed to soak and rot in the shallow lagoons, and so the fibre (coir) is obtained. Industries connected with the coconut find employment for a large number of people. The kernels are roughly dried for export as copra. Even more important is the export of carefully dried coconut prepared in factories; there are also factories for the preparation of coconut oil. The preparation of coir is mainly a cottage industry. Areca nuts are also grown for export. Of the spices for which Ceylon has long been famous, cinnamon is the most important. The cinnamon tree likes a light sandy soil, and grows in those parts of the maritime belt where such a soil is found. The industry is less important than formerly. The cinnamon of commerce is obtained from the inner bark of young shoots. Other spices are cardamoms, cloves, etc. Citronella oil, prepared from a grass, is obtained mainly in the south-west of the island. In 1925 a railway was built across the island to Trincomalee, which has helped very much to open up the country. There is a branch to Batticaloa. Round the coast, fishing is an important industry.

The capital of Ceylon—*Colombo*—is on the west coast. There is a bend on the coast which partly shelters a small harbour from the force of the South-West Monsoon. Now a fine breakwater encloses an artificial harbour, and Colombo is not only the principal port of Ceylon, but is situated on a great ocean highway from Europe to the Far East. Colombo is a sea junction on the sea routes of the world, for here the main trade route goes on to Singapore and China; but there are branches from Colombo to Madras and Calcutta, to Rangoon, and an important one to Australia. Before the harbour of Colombo was finished, *Galle* used to be the principal port of call. It has a pretty natural harbour, but one with a dangerous rocky entrance. The entrance is guarded by an old Dutch fort. *Trincomalee*, on the north-east coast, has a fine large natural harbour, but its hinterland is not important and the port is little used.

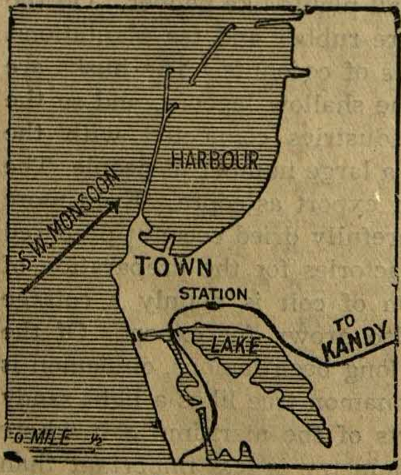


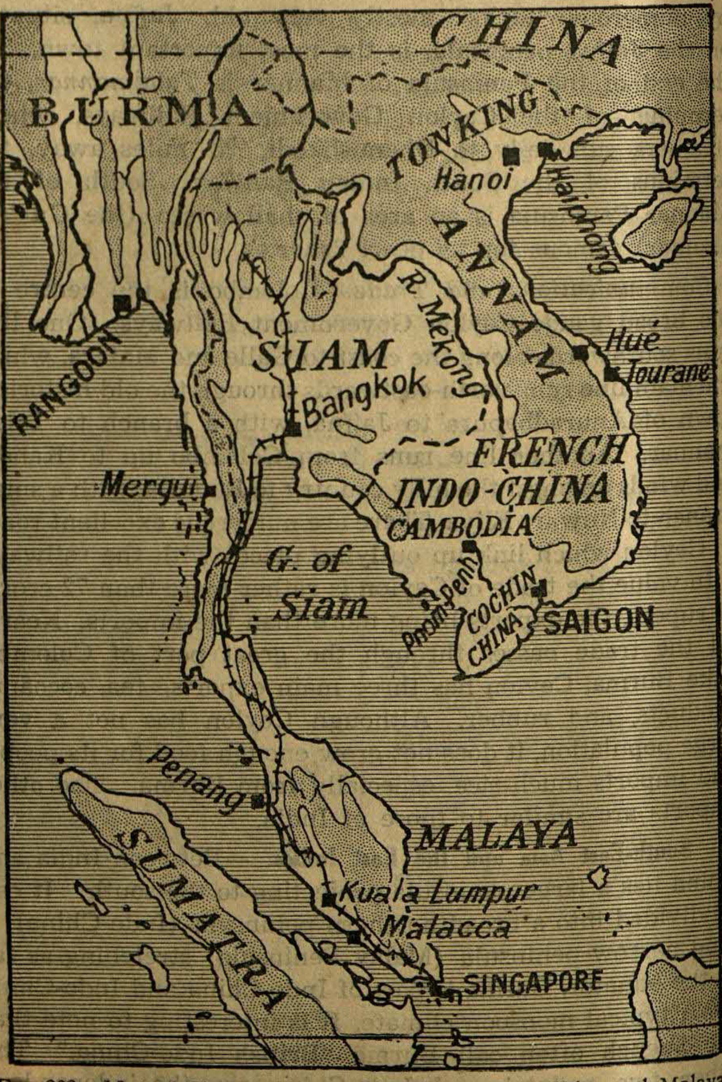
FIG. 231.—Sketch-map of Colombo Harbour, showing how it is protected from the South-West Monsoon.

*The Northern Plain.*—This does not rise more than 200 or 300 feet above sea-level. Much of the plain is formed of a pale lime-stone, sometimes covered by a thin bright red soil. Round the coast are sand dunes. Most of this region gets about 40 inches of rain, but the soil is dry and poor, and there is much waste land covered with scrub jungle. The palmyra palm flourishes in this northern region. Cultivation is protected by numerous "tanks" mostly very old. *Jaffna,* situated on the Jaffna peninsula, is the most important town. At the end of the Peninsula of Mannar is *Talaimannar,* the terminus of the Ceylon Government Railways, where steamers run daily to Dhanushkodi, 22 miles away, the terminus of the South Indian Railway. South of the Mannar Peninsula is an area of shallow sea (the Gulf of Mannar) famous for its pearl fisheries.

*Communications and Trade.*—Colombo is the centre of the broad gauge Ceylon Government Railways. One line runs southwards along the coast to Galle and Matara, whilst the main line runs north-eastwards through the old historical town of Anuradhapura to Jaffna, with a branch to Talaimannar. Another line runs from Colombo up to Kandy, and winds amongst the hilly country to Budulla, with a small branch to Nuwara Eliya. There are numerous excellent roads in Ceylon which link up outlying places with the railways.

In value the trade of Ceylon is rather more than 72 crores of rupees, the exports being more than the imports. Nearly all the trade passes through the great port of Colombo. Like Burma, Ceylon has three main exports—tea, cocoanut products, and rubber. Although Ceylon has not a very large population, it does not grow enough food for its people and imports much rice, especially from Burma. The other imports are similar to those of India.

**South-East Asia and the East Indies.** —Between India and China lies a large peninsula projecting to the south. It can be divided into a broad northern peninsula (Indo-China), a long narrow peninsula (Malay Peninsula) stretching as far as the equator. Burma is part of Indo-China and Indo-China has a typical monsoon climate. It is interesting to note that the French often call Burma "British Indo-China." The other two countries of Indo-China are the independent



F 232.—Map of Siam (now called Thailand), Indo-China and Malaya.

kingdom of Siam (Thailand) and French Indo-China. The equatorial regions of Malaya are occupied mainly by the British colonies of the Federated Malay States and Straits Settlements.

### THAILAND

Thailand[1] is a lowland country, lying between the Tenasserim Yomas on the Burmese border and the mountains of French Indo-China. Thailand has the same seasons as India and has a heavy rainfall. Rice is grown on the flat lands; it is by far the most important crop, the staple food of the people, and the principal article of export. The hills of Upper Thailand are forest-covered, and much teak is cut. The logs are floated down by river to Bangkok. In Lower Thailand, lying between Lower Burma and Malaya, much tin and wolfram are produced. The Siamese are very similar to the Burmans, and they are Buddhists. *Bangkok,* the capital and principal port lies a few miles up the river Menam. There is a railway from Bangkok to the north of the country, and a railway runs right through to Singapore. As in Burma, the imports are cotton goods, foodstuffs, metals, and machinery. Most of the trade is with Hong-Kong, Singapore, India, and Great Britain.

### FRENCH INDO-CHINA

French Indo-China comprises the small colony of Cochin-China, and a number of states which are under French protection. The whole territory falls into three parts:

(*a*) The rich rice-growing lands of Cambodia and Cochin-China, which are similar to the alluvial plain of Thailand. This lowland region is the hinterland of the port of Saigon. This is one of the great rice lands of the world, and more than half the total crop is exported. Rice forms three-quarters of the total exports of French Indo-China. The rice is milled in the busy city of *Cholon* and exported from *Saigon,* 5 miles away. Notice that the

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[1] Formerly called Siam.

Mekong runs through the great plain; but Saigon is *not* on the Mekong. Compare this with Rangoon, which is *not* on the Irrawaddy; Calcutta which is *not* on the Ganges; and Karachi, which is *not* on the Indus—all of them on smaller rivers near the main one. In the centre of Cambodia is a huge lake, full of fish. Fishing is an important industry, fish forming the second article of export. *Pnom-Penh* is the chief town of Cambodia.

(*b*) The mountainous region of Annam producing cinnamon, sugar and tea, but of much less importance. *Hue* is the principal town and *Tourane*, the port.

(c) The Tongking Region, or hinterland of the port of Haiphong. This is another rice-growing area formed by the delta of the Red River. It has rich mines of coal, tin, and zinc, as well as enormous limestone quarries, cement being made frm the limestone. Much raw silk is also produced. *Hanoi*, the capital of French Indo-China, is in this region. The people of French Indo-China are mainly Annamites, with many Chinese.

## MALAYA

The southern portion of the Malay Peninsula is under British control. It includes first the Straits Settlements, i.e., the old trading centres of Singapore, Penang, and Malacca. Malacca was occupied as long ago as 1511 by the Portuguese. Singapore was important in the fourteenth century until destroyed by the Javanesee in 1377. But secondly, the Malay Peninsula includes the Federated Malay States (occupying the largest area), consisting of a group of Native States under British protection. Thirdly, there are some native States not included in the Federation.

Malaya has a backbone of high mountains, with several parallel ranges on either side. The western side is more developed than the eastern, for it is there that vast quantities of tin ore are found in the valleys. Malaya produces more than one-third of the world's supply of tin. Malaya lies in the equatorial region, and all the hilly parts were covered with equatorial forests. About twenty years ago it was found that the climate was very suitable to the growth of the rubber tree, and now enormous areas of the country are covered by rubber plantations, Malaya producing more than half of the world's supply. There are also many cocoanut plantations and copra is exported. The chief food grain of

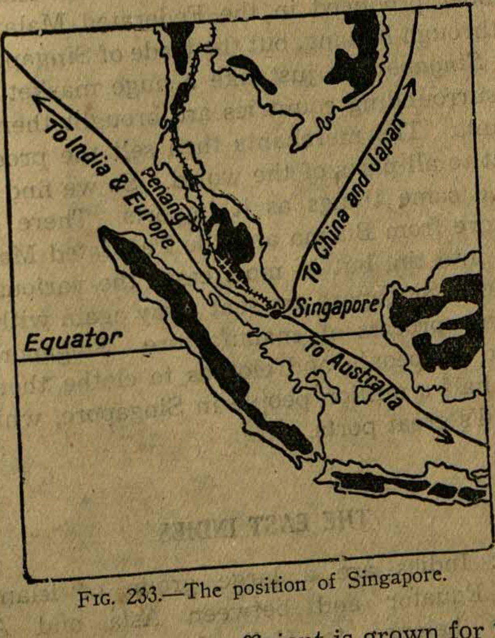

FIG. 233.—The position of Singapore.

the people is rice, but not sufficient is grown for the people's need and much has to be imported. Tin and rubber have made the Straits Settlements and Federated Malay States very rich. Fine motor roads have been built all over the country, and a railway runs through the length of the country from north to south and connects with the Siamese railways. The natives—the Malayas—are Mahommedans, but much of the trade of the country is in the hands of the Chinese. There are also many Indians.

The principal town of the Federated Malay States is *Kuala Lumpur*. There is no good port and most of the trade passes through Penang and Singapore. These two ports are both on islands. The sheltered harbour of Penang lies between Penang Island and the mainland. Singapore Island is now connected with the mainland by a railway and a road, and its harbour is on the south of the island. Much of the rubber produced in the Federated Malay States is exported through Penang, but the trade of Singapore is twice as great. *Singapore* is just like a huge market. Products from the surrounding countries are brought there and sold to merchants. The merchants then sell the produce again and send it to all parts of the world. So we find Singapore exports the same things as it imports. There are works where tin ore from Burma and the Federated Malay States is smelted into tin, but in most cases the various products which come to Singapore are sent away again without going through any process of manufacture. Singapore imports rice to feed its people and clothes to clothe them. There are nearly half a million people in Singapore, which is one of the world's great ports.

## THE EAST INDIES

The East Indies are a large group of islands lying along the Equator and between Asia and Australia. East Indies belongs to Holland. Just as the Indian Government has grown gradually out of the East India Company, so the present administration of the Dutch East Indies has grown out of the Dutch East India Company, founded in 1602. The largest islands are Borneo and Sumatra, but the most important is Java. Other important islands are Celebes and the Moluccas. The island of Java is the same size as England, and has 37,000,000 people. The staple food grains of the people are rice and maize, but the crops grown for export are sugar-cane, coffee, rubber,

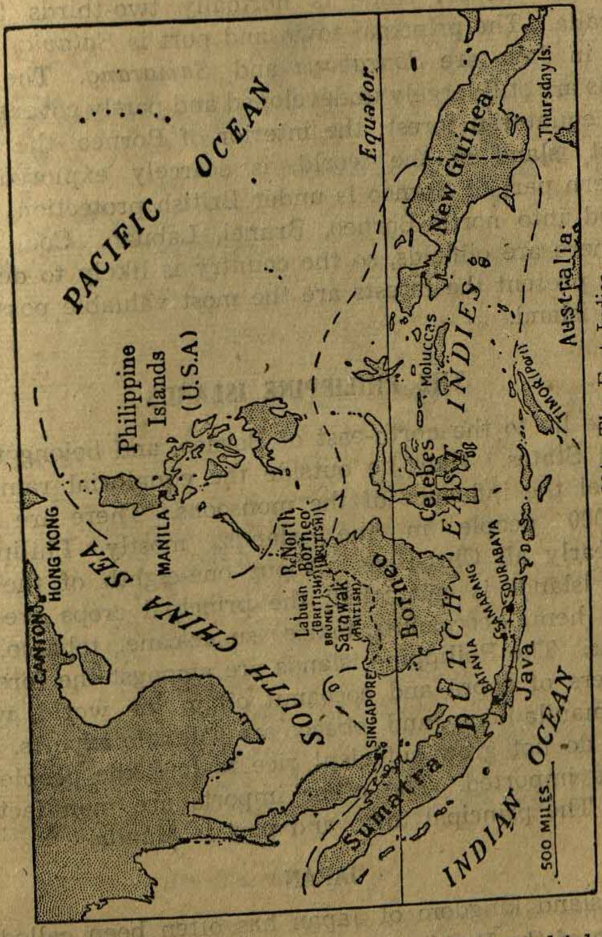

FIG. 234.—The East Indies.

coconuts, cinchona, tobacco, and manioc (from which tapioca is made). Java supplies India with much of the sugar she requires, and sends rubber, sugar and tea to Great Britain and imports in exchange manufactured goods. There are important oilfields in Java and Sumatra, also some coal mines and some tin mines. Although *Java* is such a small island the export trade is normally two-thirds that of Australia. The principal town and port is *Batavia.* Other ports in Java are *Sourabaya* and *Samarang.* The other islands are still largely undeveloped and partly covered with thick equatorial forest; the interior of Borneo, the second largest island in the world, is scarcely explored. The northern part of Borneo is under British protection, and is divided into north Borneo, Brunei, Labuan. Coal exists, and there are oilfields, so the country is likely to develop; but at present the forests are the most valuable possession of the island.

## THE PHILIPPINE ISLANDS

These lie to the north-east of Borneo, and belong to the United States. They lie outside the equatorial rain belt, and feel the influence of the monsoons. There are about 10,000,000 people in the islands, mostly Philippinos and nearly all Christians. About one-eighth of the area of the islands is cultivated; the principal crops are rice, manila hemp, cocoanuts, maize, sugar-cane, tobacco, and bananas. The Philippine islands are amongst the foremost producers of copra and cocoanut oil in the world, whilst sugar, manila hemp, and tobacco are valuable exports. The islands do not grow sufficient rice to feed the people and more is imported. The other imports are manufactured goods. The principal town and port is *Manila.*

## JAPAN

The island kingdom of Japan has often been called the "Britain of the East". Both Britain and Japan are groups of islands in temperate regions, lying one to the north-west and the other to north-east of the great land mass of

Eurasia. Japan Proper consists of four large islands forming a long curve from north-east to south-west. But

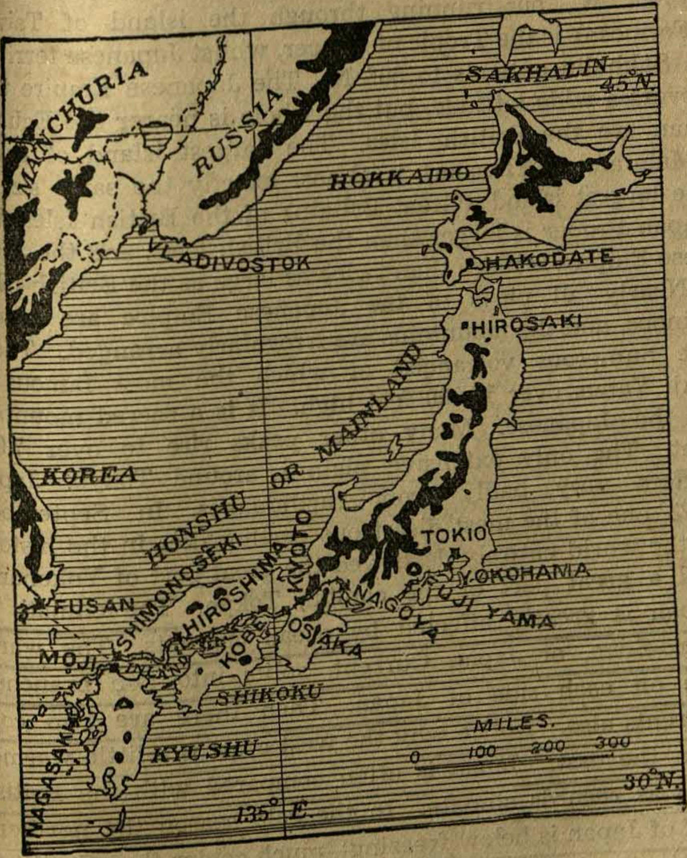

FIG. 235.—Map of Japan.

included in the Japanese Empire[1] are half the island of Sakhalin in the north, a string of small islands terminating with the large island of Formosa in the south, and the large Peninsula of Korea on the mainland of Asia. The Emperor is called the Mikado. Japan Proper extends from 30° N. to 45° N., but running through the island of Taiwan (Formosa) is the Tropic of Cancer, whilst Japanese territory in Sakhalin extends to 50° N. The Japanese Empire thus covers a wide latitude, but the whole is nearer the Equator than are the British Isles. The largest island of Japan (Mainland or Honshu) is almost exactly the same size as the largest island (Great Britain) of the British Isles; but Japan Proper is larger than the British Isles, and the Japanese Empire is more than twice as large as the British Isles.

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[1] Since her defeat in the recent World War, Japan herself is under U.S. occupation.

Nearly all parts of the Japanese Empire are mountainous, and the mountains are irregularly arranged. There are numerous volcanoes, of which the most famous is Fuji Yama, over 12,000 feet high. It is a sacred mountain to the Japanese. Many other peaks rise to over 7,000 feet. The only extensive plain is around Tokyo. Japan suffers very badly from earthquakes. In September, 1923, one of the most disastrous earthquakes in the history of the world entirely destroyed the great port of Yokohama and a great part of the capital, Tokyo. The climate of Japan is greatly affected by ocean currents. The warm Kuro-Siwo, or Japan Current, splits into two branches, one on each side of Japan. Then there are two cold currents also. Notice why the west coast is a little warmer than the east. Japan is often compared with the British Isles as regards climate. In the cold season the northern half of Japan is below freezing—much colder than Scotland, but in the hot season (July) southern Japan is as hot as the coastland of Spain. The extremes are much less than in China, because of the influence of the sea all round, but there is certainly a big variation. The north-western side of the islands gets its rain in the cold season. Snow is ore important than rain. But the south-eastern side gets heavier rainfall in the warm season when the monsoon is lowing. Japan is a mountainous country. In the north the orests are of coniferous trees usually mixed with some eciduous; in the south broad-leaved trees are more bundant. The forests are a valuable source of soft imber and are carefully looked after. They cover nearly alf of Japan.

About 60,000,000 people live in Japan and every available iece of land is used for crops. Often, villages are built on teep hillsides and the hills are cut into tiny fields. The rincipal food grain is rice, which can be grown all over the outh because of the higher summer temperature. Wheat, barley, and rye (rye in the cold north) together cover as nuch ground as rice. The other important crops are tea and obacco. Japanese tea is different from that of India or Ceylon. Most of the tea is exported to the United States; t is not liked in other parts of the world. Cattle are kept, but Japan is so carefully cultivated that there is little land left for sheep or goats. Large numbers of mulberry trees are grown to feed silkworms, for the production of silk is an important industry. The silkworms are reared by the same farmer who farms wheat, an interesting example of mixed farming. Japan produces 60 per cent. of the silk of the world. The Japanese are the most progressive and probably the cleverest of all the Mongolian races. They have adopted, and often improved, all the great inventions of Western nations and are now engaged in many kinds of manufacturing industries. There are many large industrial cities, quite like the manufacturing towns of Europe or America. The indented character of the coast has had the same effect as in England. The Japanese are a seafaring people, and have large numbers of merchant ships. They had become a first-class power, with the third largest navy in the world, and all the men who were physically fit were trained either in the army or navy. Japan has several coal-fields and produces about one-tenth of the quantity mined in Great Britain. The coal-fields are in the northern island and the southern island of Japan Proper. Japan also has oilfields but does not produce enough for her own use—only about 1/400th of the quantity produced in U.S.A. There are valuable copper deposits, but less important are gold, silver, iron, and sulphur. Fishing is an important occupation of the Japanese, and they have invented a wonderful process whereby oysters are made to form natural pearls, and large numbers of these "culture pearls" are obtained. The principal industries are the manufacture of cotton, silk, and woollen goods, paper, earthenware and glass, and matches. Japan is noted for cheap cotton and silk goods, as well as cheap toys, matches etc., but the quality is below that of other countries. The industrial revolution in Japan occurred mainly after the China-Japan War of 1894-5. The growth of factories has been extremely rapid, especially during the Great War, when the European manufacturing nations were busy fighting and making war material. Just like Great Britain, Japan has to import much of the raw materials for her industries—especially cotton (from U.S.A. and India), wool (from Australia), and iron. Japan has not nearly enough iron, and so imports iron and machinery. She cannot grow enough food for her people, and so buys rice, as well as peas, beans and sugar. By far the most valuable export is raw silk and silk goods followed by cotton goods, glassware and earthenware, matches and timber, and tea, and refined sugar.

Japan exports coal from Nagasaki and Hakodate, but imports it at other ports. *Tokyo*, the capital, is one of the world's greatest cities with two million people. It is a busy manufacturing centre. *Osaka* is the principal manufacturing city of Japan and is also a port. *Kyoto* is the old capital of Japan and a fine historic city. It has also developed numerous manufactures. *Yokohama* is the largest port of Japan; it is not only the port of Tokyo, but has large manufactures of its own. It was entirely destroyed by the earthquake and fire of 1923, and most of the merchants moved to Kobe or Osaka. They are gradually returning and the city is commencing to regain its old importance. *Kobe* is the second port of Japan. It is close to Osaka, and the whole forms one great manufacturing district. *Nagoya* is another important centre. *Nagasaki* is a coal port and an important naval station. *Hiroshima* is a large port on the Inland Sea, whilst *Moji* and *Shimonoseki* are twin ports at the western entrance to the Inland Sea. It is from here that boats go across to Korea. *Hokodate* is another town and port. Japan is well served by railways. One of the most important lines runs through the country and connects the principal towns—from Shimonoseki to Hiroshima, Kobe, Osaka, Kyoto, Nagoya, Yokohama, and Tokyo. The direction of many of the railway is controlled by the mountains of the country.

## KOREA OR CHOSEN

This is a large mountainous peninsula. After the war between China and Japan in 1895, it became independent. In 1910 it was annexed to the Japanese Empire in order that it might not be seized by Russia. The inhabitants, Koreans, number 18,000,000. Korea is an agricultural country and grows more rice, barley, peas, and beans than the people need, and so is very useful to Japan, which needs these foods. Korea is rich in minerals, including iron, which is so badly needed by Japan. The country is still undeveloped. The principal town is *Seoul*, whilst the port of *Fusan* is only very near Japan.

## QUESTIONS AND EXECISES

*N.B.*—Illustrate your answers with diagrams, sketches etc.

1. Describe the situation and account for the importance of the following:—Canton, Hankow, Singapore, Yokohama, Basra, Aden, Shanghai, Hong-Kong, Pekin, Tokyo, Osaka, Moukden. (B.U.)

2. Give geographical reasons for the following:—

(*a*) The Chinese have to build their houses even on rivers.

(*b*) The Samoyds live a nomadic life. (B.U. 1935)

(*c*) Nomadic habits of the Arabs. (B.U. 1933)

(*d*) Asia is the continent of extremes.

(*e*) Winter rainfall in Asia Minor, low rainfall in Arabia, summer rains in Indo-China, ever rain in the East Indies, and no rain in the Gobi desert.

(*f*) The river Hwang-ho is named "China's Sorrow".

(*g*) Sugar is produced in Java. (B.U. 1934)

(*h*) Malaya is the main source of the supply of rubber, though Brazil is the home of the rubber tree. (B.U. 1933)

(*i*) Japan imports raw cotton.

(*j*) Singapore is called the "Gibraltar of the East".

(*k*) The loose hold of China over her dependencies. (B.U. 1920)

(*l*) The Chinese are not as yet so advanced as the Japanese.

(*m*) Asia is known as the "Mother Continent".

3. Divide Asia into its natural regions and point out the characteristics of each of these regions. (B.U. 1932)

Show how the vegetation in each depends upon its climatic conditions. (B.U. 1926)

4. Sketch the Euphrates-Tigris region and mark on the sketch its principal towns and chief products. (B.U. 1930)

Explain the importance of the river to Iraq. (B.U. 1932)

*Or*

State the characteristics of the rivers of Asia and explain why the Arctic drainage has no importance.

5. Give an account of the physical features, climate, natural products, occupations and industries of any one of the following countries:—

(*a*) Persia. .. (B.U. 1935)

(*b*) Manchuria.

(*c*) Arabia. (B.U. 1933)

(*d*) Japan. (B.U. 1925 & 32)

(*e*) Afghanistan. (B.U. 1929)

6. Name the chief occupations of the people of Japan and explain the geographical influences that have made the people take to them. (B.U. 1935)

7. Describe how the Yangtse-Kiang has contributed to the prosperity of the countries through which it passes. (B.U. 1929)

8. Account for the following specialised products:—

(*a*) Chinese silk.

(*b*) Japanese toys. (B.U. 1935)

(*c*) Java sugar.

(*d*) The species of the East Indies.

9. Explain how geographical conditions affect the life and occupations of ıe following peoples:—
(1) The Kirghiz; (2) the Siamese; (3) the Chinese;
(B.U. 1928)
(4) the Afghans; (5) the Arabs; (6) the Japanese.
(B.U. 1927)

10. "Japan is called the Great Britain of the East." Explain this statement fully. (B.U. 1928)

*Or*

Give a geographical explanation of the rapid development of Japan. (B.U. 1922)

11. Write short notes on the following:— (B.U. 1924)
(*a*) The Kuro Siwo.
(*b*) The Monsoon lands of Asia.
(*c*) Hottentots.
(*d*) The Siberian Railway.
(*e*) The importance of Iraq to Great Britain.
(*f*) The Suez Canal.

12. Which would be the best way for a Muhammadan pilgrim to travel to Mecca?
(*a*) From Bombay. (*b*) From Constantinople.

*Or*

Plan a journey from Karachi to Singapore or from Rangoon to Shanghai. (B.U. 1925-'29-'35)

13. Give a geographical account of the following:—
Ceylon, Burma.

14. Describe the course of the Irrawaddy and the importance of the region drained by it. State the important towns there.

15. Give reasons for the following:—
(*a*) Burma exports rice.
(*b*) Sloping roofs on houses in Burma.
(*c*) Colombo is the halfway house between East and West.

16. What are the chief products of Burma? Where are they produced? For what are they used? To which countries are they sent?

*Or*

Mention the principal exports of Rangoon. What are its chief industries? (B.U. 1929)

17. Describe the situation and account for the importance of the following:—
Colombo, Rangoon, Mandalay.

18. "Burma, though it was included in the Indian Empire, was in reality a separate country." Discuss this statement.

## GENERAL QUESTIONS

Mainly selected from Anglo-Vernacular (A.V.) and English (E.) High School and Middle Scholarship (H.S. or M.S.) Examinations of the Provinces of India. Some from University College (Rangoon) Junior Intermediate (U.C.R.J.I.) and University of Rangoon Intermediate Arts (U.R.I.A.). Nos. 33-59 are taken from the Bombay University Matriculation Examination papers. A large number of different additional questions will be found in Stamp's "How to Teach Geography."

1. Give a brief account of the main wind systems of the earth, noting the causes of the winds and of their variation from one part of the year to another. (A.V., H.S., Bur., 1926).

2. If the time in Rangoon is 3 o'clock in the afternoon, what will be the time at a place 30° *east* of Rangoon? Also what would be the time at a place 30° *south* of Rangoon? Also at a place 45° *west* of Rangoon? Account for these differences. (A.V. H.S., Bur., 1926)

3. Near the coast of a certain land there is a mountain system consisting of *three* parallel ranges. The outer range is about 1500 feet high; the middle one 2000 feet high; the inner one 3000 feet high. Between the outer range and the sea is a narrow coastal plain. Between the outer and middle ranges is a valley whose bottom is 1,000 feet above sea-level. Between the middle and inner ranges is a valley whose bottom is 1500 feet above sea-level. Behind inner range is a plateau averaging 2000 feet above sea-level. Draw as accurately as you can a section through the country from the sea to the plateau. (A.V., H.S., Bur., 1926).

4. What is meant by Monsoons and how are they caused? Discuss the above with special reference to India.

5. Explain any five of the following, giving examples and sketches wherever necessary:

   Weathering, earth-pillar, sand dune, terminal moraine, continental shelf, artesian well, spring tide.

6. Describe carefully the conditions necessary for the growth of three important food grains of the world, and give a brief account of their distribution. (U.C.R.J.I., 1926).

7. India is a member of the British Commonwealth of Nations. Name some other members of the Commonwealth. Point out how India helps them and is helped by them. (A.V., M.S., Bur., 1924).

8. If you take a coastal trip from Rangoon to Singapore, what important ports will you pass? Describe the industries in which people are engaged at each one. (A.V., M.S., Bur., 1924).

9. Describe the physical features, climate, and vegetation of the Ganges Basin. (A.V., H.S., Bur., 1926).

10. Write brief notes on each of the following cities, noting especially the reasons for their having become the capitals of their respective countries: London, Paris, Madrid, Vienna, Buenos Aires, and Canberra. (A.V., H.S., Bur., 1926).

11. What food grains are grown in India and Burma? Show by sketch-maps where they are grown; indicating from which regions and by what routes the surplus, if any, is exported. (A.V., H.S., Bur., 1926).

12. What are our chief imports from the British Isles? Where in the British Isles are they produced? (A.V., H.S., Bur., 1926).

13. Give a description of the route taken by the Canadian Pacific Railway, mentioning the natural regions through which it passes. Point out its commercial importance. (A.V., H.S., Bur., 1925).

14. Compare and contrast the position, size, climate, and general physical structure of the British Isles and Japan. (A.V., H.S., Bur., 1925).

15. What conditions generally determine a good harbour? How far do these conditions hold good in case of Rangoon, Bombay, Madras, and Dunedin? (A.V., M.S., Bur., 1925).

16. Account for the position and importance of Constantinople, Riga, and Trieste. (A.V., H.S., Bur., 1925).

17. Write an account of the productions of India, using these headings:—

(1) Crops used for food—where they are grown.
(2) Crops not used for food—where they are grown.
(3) Minerals—names of minerals found—where each is found.
(4) What happens to the crops which are grown for food.
(5) What are the crops which are not eaten.

Illustrate your answer with a map. (A.V., M.S., Bur., 1925).

18. Describe a journey from Rangoon to London using these headings:—

(1) What cargo is put into the steamer at Rangoon—where each thing comes from—where it is going to.
(2) Stopping places on the way—number of days between each port and total number of days spent on the journey.
(3) What new cargo is taken on at each stopping place.
(4) The journey takes place in December. What differences would the passengers notice if they travelled in August?
(A.V., M.S., Bur., 1925)

19. What and where are the following?
Bristol; Perth; Ava; Pretoria; Chicago; Montreal; Benares; Suez; Malta; Perim. (A.V., M.S., Bur., 1924).

20. "There are regions with well-marked dry and rainy seasons, the latter occurring in the summer months. The usual vegetation is savannah, but in the wetter places such as the river sides there is forest. In the highlands where there are relief rains, forest also occurs. On the grasslands both cattle-rearing and agriculture can be carried on, although for the latter irrigation is sometimes necessary. Among the crops are maize, millet, cotton, and tropical fruits. These regions can be made very productive, and the higher-lying parts are suitable for European colonies."

(*a*) What is the "Natural Region Type" described in this paragraph?

(*b*) Give the names and positions of all the examples of this type of region that you know.

(*c*) Select any one example, draw a sketch-map of it, and write a paragraph describing it.

21. Draw a map of Tibet and write an account of the country under the headings: position and size, physical features, climate, people (life, work, and customs), exploration. (A.V., H.S., 1924).

*Or*

Write a short note on the Panama Canal and its influence on the International Commerce, particularly with the East. (A.V., H.S., Bur., 1924).

22. Give an account of what is known as West Africa under the headings: physical features, climate, people, productions, development. (A.V., H.S., Bur., 1924).

23. Draw diagrams showing the immediate environments of the following towns, and write a note on each explaining how its geographical situation is a favourable (or an unfavourable) one: Khartoum, Lyons, Rangoon, Vienna, Basra. (A.V., H.S., Bur., 1924).

24. Towns spring up at—

(*a*) The limit of ocean navigation.
(*b*) The limit of river navigation.
(*c*) At bends in rivers.
(*d*) At the confluence of two rivers.
(*e*) At waterfalls.

Give two examples of each of these, drawing a small neat diagram for each town showing the advantages of its position. (A.V., H.S., Bur., 1924).

25. Discuss fully the relative advantages of Mandalay and Rangoon as capitals of Burma. (U.R.I.A., 1926).

26. Compare and contrast the basin of the Murray-Darling with that of the Congo. (U.R.I.A., 1926).

27. Write a general account of the rivers of India, with special reference to their usefulness to man. (U.C.R.J.I., 1926).

28. Describe the character and causes of the Mediterranean climate and discuss its world distribution. (U.C.R.J.I., 1926).

29. An island lies between Europe and N. America. 95 per cent. of its surface is rocky and more than a thousand feet above sea-level. It has extensive deposits of iron and coal. What would be the nature of its climate and the occupations of the people there? What food supplies would be needed, and whence would they be obtained?

30. The following are figures for temperature (F) and rainfall (in inches) at four places: A, B, C and D:—

| | A | B | C | D |
|---|---|---|---|---|
| January | 55°—3″ | 67°—1″ | 32°—1″ | 80°—5″ |
| March | 59°—2″ | 61°—2″ | 39°—2″ | 86°—8″ |
| July | 77°—½″ | 53°—4″ | 60°—3″ | 79°—6″ |

State approximately the position of these places on the earth. Give reasons. Write what you gather about the climatic conditions there.

31. Give reasons for the following:
   (i) Berar produces cotton.
   (ii) New Zealand exports meat.
   (iii) Switzerland manufactures watches and other small goods.
   (iv) The Amazon basin is thinly populated.
   (v) Sheffield manufactures cutlery.

32. Describe the position of any *five* of the following towns, and explain how their position has affected their growth: (1) Rio de Janeiro; (2) San Francisco; (3) Sydney; (4) Liverpool; (5) Chicago; (6) Colombo; (7) Basra; (8) Delhi.

33. The following statements can be made true by filling in the blanks with *one* of the words or figures given in brackets at the end of each sentence. Rewrite the statements with the blanks correctly filled in:
   (i) There are . . . mines in Burma. (copper, tin, gold).
   (ii) There are rock-salt mines in . . . (Bengal, the Punjab, Mysore).
   (iii) Colombo is . . . miles from Aden. (2,100, 610, 7,600).
   (iv) Allahabad is to the . . . of Benares. (East, North, West).
   (v) . . . is the seat of government of the United Provinces. (Cawnpore, Allahabad, Lucknow).
   (vi) Zanzibar exports . . . (sugar, cloves, coffee).
   (vii) The latitude of Berlin is . . . (52°N., 12°N., 22°S.).
   (viii) . . . Chile produces saltpetre. (Central, Southern, Northern).
   (ix) The Kalahari is a . . . (forest, desert, mountain).

34. Draw a map of India and show thereon areas of (1) coal mining, (2) iron works, (3) cotton manufacture, and (4) woollen manufacture.

What has changed Bombay from a small fishing village to a great centre of trade and industry? Explain fully.

35. Mention the principal factors that affect the growth of towns and cities. Illustrate your answer with reference to the following: Yokohama, Berlin, Glasgow, New Orleans and Canton.

36. Explain why:
   (1) Karachi has little rain while Calcutta has it in plenty.
   (2) Rice grows abundantly on the western side of the Western Ghats and not as much on the eastern side.
   (3) Days are very hot and nights very cold in desert areas.
   (4) The Madrasis are darker in colour than the Kashmiris or the Punjabis.
   (5) The sun does not, at sunrise, appear at the same place in the sky all the year round.

37. Describe how the Danube, the Yangtse-kiang, the Nile, and the Mississippi have contributed to the prosperity of the countries through which they pass.

38. Explain why:
    - (1) There are more irrigation canals in Sind and the Punjab than elsewhere in India.
    - (2) The day is longer in summer than in winter.
    - (3) The Gangetic Plain is more thickly populated than any other part of India.

39. Describe how the geographical position of the following places has contributed to their importance: Peshawar, Singapore, Port Said, Marseilles, Liverpool and San Francisco.

40. Give an account of the physical features, climate, natural products, industries and manufactures, and peoples of one of the following countries: Afghanistan, Canada, Ceylon, and Belgium.

41. Write in short what you know about the following:
    - (1) Captain Cook, Vasco da Gama, Columbus, Ferdinand de Lesseps, and Captain Drake.

*Or*

    - (2) The Actic, Antarctic and the Himalayan Expeditions.

42. Mention the principal exports of Bombay, Calcutta, and Rangoon, and account for the difference in the nature of these exports.

43. Draw a map of India (including Pakistan), showing areas of heavy, moderate, and scanty rainfall.

Briefly explain the causes of the difference in the amount of rainfall in the different areas.

44. Describe the situation and account for the importance of any *five* of the following towns: Colombo, Cairo, Istambul, Vienna, Chicago, Melbourne, Canton, Calcutta.

45. Sketch any *two* of the following, and mark on the sketches their principal towns and chief products:
    - (i) The Ganges Basin;
    - (ii) The Nile Valley;
    - (iii) The St. Lawrence Basin;
    - (iv) The Euphrates-Tigris region.

46. Explain the circumstances that favour the growth of:
    - (i) The cotton industry in Bombay.
    - (ii) The jute industry in Calcutta.
    - (iii) The woollen industry in Cawnpore.
    - (iv) The iron and steel industry in Jamshedpur.

47. Mention the chief countries that produce gold, petroleum, wool and rubber, and explain the conditions that favour the production of wool and rubber in the countries specified by you.

48. Select any two towns in the Bombay Presidency more than 300 miles apart, and describe the country between these two towns under the following heads: Physical features, climate, density of population, occupations, and commercial products.

49. Give a geographical explanation of the following:
   (i) Panipat has been the scene of many decisive battles in Indian History.
   (ii) Invasions by land on India have been from the North-West.
   (iii) The Nile Valley has been the seat of early civilization.

50. Mention the three railway routes from Bombay to Delhi and describe a journey along any one of the routes with special reference to the physical features and crops of the lands through which the route passes.

51. Draw sketches of the basins of the Indus and the Ganges. Compare and contrast these basins as regards the climate, agricultural products, and the life and occupations of the people.

52. Divide the Bombay Presidency into its main natural regions and describe their chief features.

53. Plan a tour round the world starting from Bombay. Mention the principal towns on your route and describe the exports and imports at any *two* of the ports you visit.

54. Describe the situation and account for the miportance of any *five* of the following: Hankow, Osaka, Los Angeles, Winnipeg, Leeds, Geneva, Genoa, Moscow.

55. Draw a map of India (including Pakistan) and show on it the following:—
   (i) The Tropic of Cancer.
   (ii) Areas producing (*a*) cotton, (*b*) tea, (*c*) wheat.
   (iii) Railway routes from Bombay to Calcutta and to Madras with two towns on each route.

56. Explain why:—
   (i) The days at the Equator vary very little in length throughout the year, but at the Poles they vary a great deal.
   (ii) Deserts occur on the Tropics.
   (iii) The people of Switzerland make small but costly articles, such as watches and lace.
   (iv) On a journey from Bombay to New York via the Panama Canal, you observe the same day twice when crossing the date line.

57. Describe a journey by land between any one of the following pairs of towns, mentioning the physical features, climate, crops and industries of the land along the route:—
   (*a*) Sukkur and Bombay.
   (*b*) Ahmedabad and Poona.

58. (*a*) With what countries does India trade by land routes and in what commodities?
   (*b*) Give the chief exports of Bobmay, Calcutta and Karachi and explain why they are different.

59. Write short notes on any *two* of the following:—
   (*a*) Modern methods of transport.
   (*b*) Irrigation in India and Egypt.
   (*c*) Life in Equatorial lands.
   (*d*) How the height of the land can be shown on maps.

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